(17,305.)

SUPREME COURT OF THE UNITED STATES.

OCTOBER TERM, 1899.

No. 217.

THE MOFFETT, HODGKINS AND CLARKE COMPANY PETITIONER,

vs.

THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. BARNARD, AND JOHN W. SCHROTH, COMPOSING THE EXECUTIVE BOARD OF THE CITY OF ROCHESTER.

ON WRIT OF CERTIORARI TO THE UNITED STATES CIRCUIT COURT OF APPEALS FOR THE SECOND CIRCUIT.

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a United States Circuit Court of Appeals for the Second Circuit.

THE MOFFETT, HODGKINS & CLARKE COMPANY, Complainant, Appellee,
vs.
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John W. Schroth, Composing the Executive Board of the City of Rochester, Defendants, Appellants.

Transcript of Record.

Appeal from the circuit court of the United States for the northern district of New York.

[Stamped:] United States circuit court of appeals, second circuit. Filed Dec. 18, 1897. William Parkin, clerk.

1 United States Circuit Court, Northern District of New York.
In Equity.

MOFFETT, HODGKINS & CLARKE COMPANY
against
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester.

To the honorable the judges of the United States circuit court for the northern district of New York:

The Moffett, Hodgkins & Clarke Company, a corporation duly organized and incorporated under and pursuant to the laws of the State of New Jersey, and engaged in the business of contractors, and being a citizen of the State of New Jersey, brings this its bill of complaint against the City of Rochester, a municipal corporation duly organized and incorporated under and pursuant to the
2 laws of the State of New York, and George W. Aldridge, William W. Barnard and John U. Schroth, composing the executive board of the city of Rochester, all of whom are citizens of the State of New York, and inhabitants of the northern district of said State of New York, and residents therein, and thereupon your orator complains and says:

That the executive board of the city of Rochester has under the provisions of the charter of said city, control of the water works thereof, and of the construction of all extensions and additions, improvements and repairs of the same, and is authorized to let contracts for such extensions and additions of its works as may from time to time be deemed necessary. That heretofore, to wit, on or about the 10th day of December, 1892, the said executive board determined to make certain improvements and extensions and additions to the water works of the said city of Rochester, among other

things, to construct a masonry conduit for a distance of 12,000 feet from Hemlock lake, northward, and proposed to enter into the contract with suitable persons or corporations for the performance of such work, the contract thus to be entered into being known as contract No. 1.

That at the same time said executive board also determined to construct a riveted steel pipe conduit, 38 inches or 40 inches in diameter, and all the required appurtenances thereto, commencing at the north end of said masonry conduit and terminating at Mt. Hope reservoir in the city of Rochester; the length of such conduit being about 140,000 feet, and the said executive board proposed to enter into a contract with suitable persons or corporations for the construction of said last-named conduit, which contract was known as contract No. 2.

3 That the said executive board thereupon, through its engineer, prepared voluminous specifications, proposals and directions relative to such proposed contracts, the same being embodied in printed form and covering in the aggregate about 300 closely printed pages, and specifying elaborately and with infinite detail the requirements of the said executive board, the method in which the work contemplated was to be performed, the character of the materials required to be furnished, and the tests to which said materials were to be subjected. A copy is hereto annexed, marked Schedule D, and is hereby, with other schedules hereto annexed, made a part of the bill of complaint.

That the said executive board did not give public notice of its purpose of letting said contracts until on or about the 10th day of December, 1892, and on said day notice was given to contractors of the fact that sealed bids or proposals for the work contemplated with respect to said masonry conduit and riveted steel pipe conduit would be received at the office of said executive board in the city of Rochester, N. Y., until 12 o'clock at noon of December 23, 1892, at which time and place such bids as might have been submitted were to be publicly opened by the chairman of said board and read.

That your orator, which is engaged in the business of contracting, has an office in the city of New York, where it keeps employed its engineers, and whose duty it is to prepare proposals upon work of the character contemplated by said executive board. That the officers of your orator were engaged during the month of December in important and distracting occupations connected with their business, which required them to delegate the duties ordinarily performed by them, with respect to proposals of the character

4 hereinbefore described, to their subordinates. That the agents of your orator, although they exercised due diligence to possess themselves of copies of the forms of proposal of contract and specification prepared by the engineer of the said city of Rochester, were unable to procure the same until on or about the 15th day of December, 1892. That upon receiving said printed information the engineer of your orator, who is charged with the examination of said proposal of contract and specifications, and with the preparation of your orator's bid thereon, proceeded to the city

of Rochester on the 20th day of December, 1892, having attempted to familiarize himself in the meantime with the terms of said proposed contracts, and there conferred with the engineer of the said executive board, visited the line of the proposed conduit, and thereupon proceeded with the preparation of your orator's proposal for the work contemplated by said contracts, known as Nos. 1 and 2.

That the labor devolving upon him in the period of time allowed for the preparation of the proposals for said work rendered the said engineer nervous and confused, so that in transcribing the figures prepared by him for insertion in form of proposal prepared by the engineer of the said executive board he accidentally and unintentionally made certain clerical errors, which your orator will now proceed to describe.

That said contract No. 2 submitted to the contractors for consideration two different routes over 8,000 feet of the 140,000 of the said proposed steel conduit, said routes being designated in said printed form of proposal and specifications as "A" and "B," and the board reserved the right of electing either of said routes, and the further electing to require a 38-inch pipe or a 40-inch pipe as the pipe to be furnished by said contractors.

5 That route "A" was located in the alluvial flats through which the Honeoye creek meanders, and involved several crossings of the existing and former channels of said creek. Route "B" was located wholly on the west side of Honeoye creek, and required the construction of a tunnel with the necessary shafts, inlet and overflow chambers, manholes and other appurtenances.

The specifications and form of proposal with reference to route "A" involved 61 different items and quantities of work and materials. The specifications and form of proposal as to route "B" involved 75 different items and quantities of work and materials in addition thereto. That among the items of route "B" was that known as "d," which was described in the form of proposal in the following language: "For all earth excavations in open trenches or pits, for the masonry and pipe conduit, entrance and overflow chambers, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and sheeting, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, bailing and draining, and all incidental work."

That item "d" in route "A" was in precisely the same language as that just quoted. That the quantities for said item as prepared by the engineer declared that the quantity of excavation contemplated by said items was 184,000 cubic feet of earth. That the same item in each route referred to precisely the same work.

That your orator and its engineer intended to bid for said work the sum of $.70 per cubic yard, which sum was a fair and reasonable price for the said work. That in the proposal relating

6 to route "A" your orator's engineer inserted in the blank provided for that purposes in said printed proposal furnished by the defendant, both in words and figures, the sum of $.70. That

through inadvertence, confusion, accident and mistake the said engineer, in the haste of transcribing his memoranda into the printed form of proposal, inserted as the price for said work the sum of $.50 per cubic yard, the difference between the price thus inserted in the proposal relating to route "B" for the same work for which said proposal for route "A" had been prepared, and the price intended to be charged therefor by your orator was some $36,800.00. That the sum of $.50 per cubic yard of earth excavation under specifications as prepared by the engineer for the defendants, is a wholly inadequate and insufficient price for such work. That the said proposal for route "B" also contained an item in the following language, to wit: "'h.' For all earth excavation in tunnel, including all necessary bracing, timbering, lighting, ventilating, removal and back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping, bailing and draining, and all incidental work." That defendants' engineer estimated the quantity of excavation required under this item of the proposed contract at 2,000 cubic yards. That it was the intention and purpose of your orator and its engineer in the preparation of its proposal for said work to charge for such earth excavation the sum of $15.00 per cubic yard, which was a fair and reasonable charge for such work. That in the haste and confusion of the preparation of said proposals by your orator's engineer, and in transcribing his figures into said printed form of proposal prepared by the defendants' engineer, by inadvertence, accident and mistake, your orator's engineer, who is extremely near-sighted, instead of specifying the sum of $15.00
7 per cubic yard for said work, inserted in the blank left for that purpose the sum of $1.50 per cubic yard. That the said sum was a grossly inadequate and insufficient price of said work, and was far below what would be the actual cost to your orator for this work under the most favorable circumstances. That the difference of the bid for said item work as inserted in said printed proposal, and as intended to be inserted therefor therein, is the sum of $27,000.

That your orator's engineer, in the preparation of said proposals was so limited as to time that he did not actually complete filling out of the blanks relative to route "B" in said contract No. 2 until 12 o'clock at noon on the 23d day of December, 1892, and neither he, nor any of the officers of your orator were able after the filling out of said blank to re-examine or compare or confirm the accuracy of the figures inserted therein.

Your orator further says that the defendant in its requirements of contractors provided that each proposal should be accompanied by a bond, executed by two or more freeholders of the State of New York, or surety companies, incorporated under the laws of said State in the penal sum of $90,000, conditioned that the person, firm or corporation, making a bid for said work, if it should be accepted would perform the work or furnish the materials or both, mentioned in the proposal of such firm or corporation, and at such time or place as might be required by said board, would enter into a contract in accordance with said notice to contractors with the city of

Rochester. That your orator procured the execution of such a bond with Henry D. Lyman and the American Surety Co., as sureties, said bond being executed in the city of New York by your orator and said sureties. That at the time of the execution of said
8 bond the proposal annexed thereto was entirely in blank, the said engineer being then at the city of Rochester engaged in the preparation of his figures. That said bond was brought to the city of Rochester by one of the officers of your orator on the said 23d day of December, 1892. That in the short time elapsing between his arrival at the said city and the time of the presentation of proposals to said executive board it was impossible to insert in said pamphlet containing said bond the proposals of your orator for the work contemplated by contracts Nos. 1 and 2, or either of them.

That accordingly, the prices for the work contemplated by said several contracts were inserted in other and different pamphlets of the same general character as that containing said bond, but were not signed or in any way executed by your orator or by any of its officers in its behalf. That after the filling in of said items in said printed forms of proposal as hereinbefore described, your orator placed into a single package the said pamphlet containing said bond and the pamphlets containing its proposals for said contracts numbers 1 and 2. That it was led to believe by these defendants and their officers that although the masonry conduit and riveted steel pipe conduit were separately described they constituted a continuous piece of work and that a person, firm or corporation, bidding upon both sections of said conduit whose bids were lower in the aggregate than the bids of any other contractors for the same work should be awarded the contract therefor. That with this understanding and with the intention and purpose of making a single proposition for the entire work your orator deposited said package containing the proposals for the work contemplated upon both sections with the said executive board. That the notice to contractors prepared by the said defendants provided that every bid for the masonry
9 conduit should be enclosed in a sealed envelope endorsed, "Proposal for performing contract No. 1, Rochester water-works conduit," and that every bid for the riveted steel pipe conduit should be enclosed in a sealed envelope and endorsed, "Proposal for the performing of contract No. 2, Rochester water-works conduit." That your orator did not comply with said provision, but addressed the package in which both said proposals were contained to the executive board of the city of Rochester.

That immediately upon presenting to the executive board of the city of Rochester the said proposals, the same were opened by the direction of the chairman of the said board, George W. Aldridge, and upon his observing the form in which your orator's proposals were presented he declared them to be informal and not in compliance with the requirements adopted by the executive board in its notice to contractors, and that they could not be received. That they were nevertheless read together with the other proposals which were presented at the same time by other persons, firms and corporations. That the proposal of your orator for line "B" in con-

tract No. 2 was read by the clerk of said executive board in the presence of the members of said board before any other proposals for the work on said line were read. That immediately upon reading item "d" relating to earth excavation in open trenches, the engineer of your orator, who prepared said proposals, informed the members of the said executive board that the price which had been read, to wit, $.50 per cubic yard, was a clerical error, that it was the purpose and intent of your orator to charge for said work the sum of $.75 per cubic yard, the same price charged for the identical work on line "A." That the aggregate of the proposals for
10 the work described in contract No. 1 by the several bidders for said work are as follows:

W. H. Jones & Son, Rochester	$262,518 00
Whitmore, Rauber & Vicinus	385,977 5
Rochester Construction Co	394,500 00
Carroll-Porter Boiler & Tank Co	399,006 00
N. L. Bayer & Co	415,967 00
Moffett, Hodgkins & Clarke Co	473,790 00

That the various bids made by firms and corporations who made proposals under the specifications of contract No. 2, and the bids of each of said firms and corporations for each item of said work appears in the tabulated statement of which a copy is hereto annexed and marked Schedule "A." That the price charged by each of said bidders for earth excavation in open trench on route "A" were as follows:

Your orator	70 cts. per cu. yd.
Whitmore, Rauber & Vicinus	75 cts. " "
Rochester Construction Co	80 cts. " "
Carroll-Porter Boiler & Tank Co	85 cts. " "

That the prices charged for the same work upon route "B," as inserted in the proposals, were as follows:

Your orator	50 cts. per cu. yd.
Whitmore, Rauber & Vicinus	75 cts. " "
Rochester Construction Co	80 cts. " "
Carroll-Porter Boiler & Tank Co	85 cts. " "

That the prices charged by the various bidders upon the proposals for performing contract No. 2, for earth excavations in tunnel upon route "B," as contained in their proposals as deposited with the defendants, were as follows:

Your orator	$1.50 per cu. yd.
Whitmore, Rauber & Vicinus	15.00 " "
Carroll-Porter Boiler & Tank Co	12.00 " "
Rochester Construction Co	12.00 " "

11 That the aggregate prices charged by the several bidders in their proposals for work on route "B" aforesaid, are as follows:

Your orator	$857,552 50
Whitmore, Rauber & Co	1,130,195 00
Carroll-Porter Boiler and Tank Co	1,215,382 00
Rochester Construction Co	1,349,935 00

That allowing to your orator the amount of its errors, viz., $63,800, in addition to the prices inserted in the printed proposal for the work on route "B" as aforesaid, the total amount charged by your orator for a 38-inch pipe for said route "B" would amount to $921,354.50. That said corrected sum is $208,842.50 less than the next lowest bid for said work, to wit, that of the firm of Whitmore, Rauber & Vincinus. That the aggregate of the bids of your orator for the work described in the contract No. 1 and the corrected bid for the work of laying a 38-inch pipe upon route "B" is $1,395,142.50. That the said sum is considerably less than the aggregate bids of any other contractor bidding upon the work described in said contracts Nos. 1 and 2. That the aggregate of your orator's bid on contract No. 1, and its bid as presented for a 38-inch pipe on line "B," — $1,331,342.50, which sum is largely below the aggregate of any two other bids for the work described in contract No. 1 and the work of laying a 38-inch pipe on line "B."

Your orator further complains and says that the defendants, notwithstanding the rights and equities of your orator, intending to take undue, improper and unconscionable advantage of the form and manner in which its proposals for said work under contracts Nos. 1 and 2 were presented to the executive board of the city of Rochester and of the clerical errors and mistakes contained in its pro-
12 posal for work on line "B" of said contract No. 2, on or about the 10th day of January, 1893, notified your orator that the said defendants proposed to enter into a contract for the work described in the proposals for contract No. 1 with W. H. Jones & Son, although the proposals of your orator for the work under both contracts were the lowest in the aggregate of any proposals for the entire work contemplated by said defendants. That thereupon, on the 11th day of January, 1893, before any official action with respect to letting said contracts was taken by the defendants herein, your orator protested against the dividing of said proposals and letting the work described in contracts Nos. 1 and 2 separately, and insisted that said defendant was bound to either enter into a contract with it for the entire work described under both contracts or none at all. That at the same time your orator informed the defendants of the clerical errors that had been committed by its engineer in the entering of the statement of his prices for the work on line "B" with respect to the earth excavations in the trench and in the tunnel, and demanded that the said executive board should permit your orator to correct said errors. That it further demanded that the contract for both sections of work in its entirety should be awarded to it at the corrected prices, or that it might be allowed to withdraw its proposals and that the same should be returned to it. That thereafter and on the 12th day of January, 1893, the defendants, composing the executive board of

the city of Rochester, N. Y., acting in bad faith, and with the purpose of taking an unfair, undue and unconscionable advantage of the clerical errors committed by the engineer of your orator aforesaid, the commission of which the said defendants conceded, the executive board adopted the resolutions
13 which are hereto annexed and marked Schedule "B," and caused copies thereof to be served on your orator on the 14th day of January, 1893, and the said defendants now propose, in conformity with said resolutions so adopted by said executive board, to insist upon the execution by your orator of the contract for laying a 38-inch pipe on route "B" for the prices inserted by your orator's engineer in said proposal deposited with said executive board. That said defendants intend, in case your orator shall fail to enter into the contract so required by said defendants, to declare your orator in default and the bond executed by it as aforesaid, a copy of which is hereto annexed and marked Schedule "C," forfeited, and thereupon to proceed to enforce the penalty of said bond. That the said threatened action of the defendants is contrary to good conscience and good morals, and a violation of the terms and conditions upon which said proposals were invited by them, and in contravention of the expressed intention, purpose and rights of your orator. That said proposed action of the defendants, unless restrained by this honorable court, would cause your orator irreparable injury for which he had no adequate remedy at law. That the matter in dispute between your orator and the defendants, exclusive of interest and costs, exceeds the sum or value of $2,000.

And forasmuch as your orator can have no adequate relief except in this court, and to the end, therefore, that the defendants may, if they can, show why your orator should not have the relief hereby prayed, and may make a full disclosure and discovery of all the matters aforesaid, and according to the best and utmost of their knowledge, remembrance, information and belief, full, true, direct and perfect answer make to the matters hereinbefore stated
14 and charged; but not under oath, an answer under oath being hereby expressly waived. And your orator prays:

That the said proposals for laying a 38-inch pipe on line "B" may be reformed and amended so that the price charged for earth excavation in open trench shall be seventy cents per cubic yard instead of fifty cents per cubic yard, and that the price for earth excavation in the tunnel may be reformed and amended so as to entitle your orators to $15 per cubic yard instead of $1.50 per cubic yard; or that said proposal be entirely rescinded, cancelled and declared null and void; that the defendants, composing the executive board of the city of Rochester, be either required to enter into a contract with your orators for the work described under contract No. 1, and also for laying a 38-inch pipe on line "B," under contract No. 2, at the price so reformed and corrected, or that the bids of your orator for the whole of said work be rejected as an entirety.

And your orator further prays that the defendants and each and every of them and their several clerks, attorneys and agents, be per-

petually restrained and enjoined by a writ of injunction to be granted by your honors, issued out of and under the seal of your court from in any way declaring your orator in default with respect to the proposals made by it for the work of laying a 38-inch pipe on line "B" aforesaid, and furnishing the materials therefor, or from declaring the bond executed by and in behalf of your orator, forfeited, or from in any manner suing upon or attempting to enforce or collect the said bond, or from entering into contract No. 1 with any other person or corporation.

And your orator further prays that a provisional or preliminary injunction be issued restraining the said defendants in like manner as prayed for with respect to the perpetual injunction of this
15 honorable court, pending this cause, and for such other and further relief as the equity of the case may require and to your honors may seem meet.

May it please your honors to grant unto your orator not only a writ of injunction conformable to the prayer of this bill, but also a writ of subpœna of the United States of America directed to the City of Rochester and to the said George W. Aldridge, William W. Barnard, and John U. Schroth, composing the executive board of the city of Rochester, N. Y., commanding them on a day certain to appear and answer to this bill of complaint, and to abide and perform such order and decree as to the court shall seem proper and required by the principles of equity and good conscience.

JENNEY & MARSHALL,
Solicitors for the Complainant.
LOUIS MARSHAL, *Complainant's Counsel.*
MOFFETT, HODGKINS & CLARKE CO.,
By C. T. MOFFETT, *Sec'y.*

UNITED STATES OF AMERICA,
Northern District of New York, Onondaga County, } *ss:*

On this 18th day of January, 1893, before me personally appeared C. Todd Moffett, the secretary of The Moffett, Hodgkins & Clarke Company, the complainant above named, who, being by me duly sworn, deposes and says that he is the secretary of the Moffett, Hodgkins & Clarke Company and is familiar with its business. That he has read the foregoing bill of complaint and knows the contents thereof, and that the same is true to his own knowl-
16 edge, except as to the matters therein stated on information and belief, and as to those matters he believed it to be true.

C. TODD MOFFETT.

Subscribed and sworn to before me this 18th day of January, 1893.

BENJ. STOLZ,
[L. S.] *Notary Public, Onondaga Co., N. Y.*

SCHEDULE B.

OFFICE OF THE EXECUTIVE BOARD,
ROCHESTER, N. Y., *Jan.* 12, 1893.

By Mr. SCHROTH:

Resolved, That the proposal of the Moffett, Hodgkins & Clarke Co., of New York, N. Y., submitted on Dec. 23, 1892, for the construction of a riveted steel pipe conduit 38 inches in diameter, and all the required appurtenances thereto, commencing at the north end of the contemplated masonry conduit near the village of Hemlock Lake, Livingston Co., N. Y., and terminating at Mt. Hope reservoir, in the city of Rochester, N. Y., and by route "B" as described in the notice of letting for said work, be and the same is hereby accepted, and that said work be and hereby is awarded to said Moffett, Hodgkins & Clarke Co.

By Mr. SCHROTH:

Resolved, That the Moffett, Hodgkins and Clarke Co., of New York, be and they are herewith required to attend at the office of this board, along with the sureties to be offered by said company, on or before Thursday, Jan. 19, 1893, and to execute at that
17 time the contract for the performance of the work of constructing a riveted steel pipe conduit 38 inches in diameter, and all the required appurtenances thereto, by route "B," from the north end of the contemplated masonry conduit near the village of Hemlock Lake, Livingston Co., N. Y., to Mt. Hope reservoir in the city of Rochester, N. Y., and that the failure of such attendance and execution will be regarded as an abandonment of intention on the part of said Moffett, Hodgkins & Clarke Co. to perform said work.

By Mr. SCHROTH:

Resolved, That the clerk be, and he is hereby directed to cause immediate legal service of notice of award of contract to be made on the Moffett, Hodgkins & Clarke Co., of New York, N. Y., in accordance with the foregoing resolutions.

I hereby certify that the foregoing resolutions were adopted at a meeting of the executive board of the city of Rochester, N. Y., held at the office of said board on Jan. 12, 1893, and that the same are true copies of the minutes of said meeting.

THOS. J. NEVILLE,
Clerk of Executive Board.

Schedule C appears at page 41 to 48 of Exhibit Contract No. 2, which follows the oral testimony.

Schedule D is the same as Exhibit Contract No. 2.

18 United States Circuit Court, Northern District of New York.

THE MOFFETT, HODGKINS & CLARKE Company, Complainant, *vs.* THE CITY OF ROCHESTER and GEORGE W. Aldridge, William W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, Defendants.	In Equity.	No. 6132.

The joint and several answer of The City of Rochester and of George W. Aldridge, William W. Barnard, and John U. Schroth, composing the executive board of the city of Rochester, the above-named defendants, to the bill of complaint in the above-entitled action.

In answer to said bill said defendants say as follows:

I. They admit that said defendants, comprising the executive board, have, pursuant to the statute in such case made and provided, control of the water works of said city, and of the construction of all extensions and additions, improvements and repairs of the same, and are authorized to let contracts for such constructions, extensions and additions, as may, from time to time, be deemed necessary.

19 They admit that said executive board did determine and propose to enter into contract No. 1, to construct a masonry conduit, as set forth in said bill of complaint.

They admit that said executive board also determined and proposed to enter into contract No. 2, to construct a riveted steel pipe conduit, as set forth in said bill of complaint.

They admit that said executive board did prepare proper specifications, proposals and directions relative to said proposed contracts, in a printed form, specifying the requirements of said executive board, the method in which the work contemplated was to be performed, the character of the materials required to be furnished, and the tests to which said materials were to be subjected.

They admit that said executive board did give legal and proper public notice, as required by the statute in such case made and provided, of its purpose of letting said contract, and requiring such contractors to submit sealed bids or proposals for the work contemplated in the aforesaid contracts.

They admit that the executive board required, among other things, that the proposals for contract No. 2 should be accompanied with a bond, executed by two or more sureties, or by a security company incorporated under the laws of the State of New York, in the penal sum of ninety thousand dollars, conditioned that the person, firm or corporation making a bid for such work, if it should be accepted by said executive board, would perform the work or furnish the materials, or both, mentioned in the proposal of such firm or corporation, at such time or place as might be re-

quired by said board, and would enter into a contract with said city of Rochester in accordance with the notice of said executive board to contractors.

They admit that said complainant did, on the 22d day of
20 December, 1892, duly procure the execution of the bond required as aforesaid, and annexed the same to the proposal of said complainants for said contract No. 2.

II. They do not know and cannot set forth as to their belief, or otherwise, whether said complainant was or is a corporation duly incorporated and organized, was or is engaged in the business of contracting in the State of New Jersey, and has, or had, its office in the city of New York, where it keeps employed its engineers, whose duty is to prepare proposals upon work of the character contemplated by the aforesaid contracts; or whether the officers of the complainant were, during the month of December, 1892, engaged in important and distracting occupations connected with their business, which required them to delegate to their subordinates the duties ordinarily performed by them with respect to proposals of the character hereinbefore described, or whether the complainant, or its agents, were unable to procure before the 15th day of said December, copies of the form of said contract, and proposals for the contract and specifications prepared by the engineer of said city; or whether the labor devolving upon the engineer of the complainant rendered him nervous and confused, so that in transcribing the figures prepared by him for insertion in the form of said proposal prepared by said engineer of said executive board, he accidentally and unintentionally made certain errors described in the complainant's bill of complaint; or whether, through inadvertence, confusion, accident and mistake, the engineer of said complainant, in the haste in transcribing his memorandum into the printed form of proposal for route B, did insert, as the price for the work set forth in item *d*, the sum of fifty cents per cubic yard, instead of
21 seventy cents; or whether said price of fifty cents per cubic yard is wholly inadequate and insufficient for such work; or whether the engineer of said complainant did, in the haste and confusion of the preparation of said proposals, in transcribing his figures on the printed form of said proposal, insert the sum of $1.50 per cubic yard for item *h*, of route B, in said contract No. 2, to wit: "For all earth excavation in tunnel, including all necessary bracing, timbering, lighting, ventilating, removal and back-filling and other final disposal of the excavated material, with a haul of 1,000 feet or less, pumping, bailing and draining, and all incidental works," instead of the sum of $15.00 per cubic yard for such work; or whether the price of $1.50 per cubic yard is a grossly inadequate and insufficient price for said work; or whether the engineer of said complainant was in any way limited in doing his work for said complainant to complete his proposal for said contract to said executive board; or whether said complainant was led to believe by said defendants, or any of its officers, that said contracts Nos. 1 and 2 would be let jointly, and not separately; or whether the complainant's proposal for said contract No. 2 was, by said execu-

tive board, declared informal, and the same could not be received; or whether the complainant's engineer did, before said executive board upon the day said proposals were canvassed by said board, notify said board that the price which had been read for item *d*, of route B, in said contract No. 2, of fifty cents per cubic yard was a clerical error.

III. Said defendants allege and state the fact to be that said executive board having full power and control over the water works of said city, did determine to let contracts for the construc-
22 tion of a conduit or conduits for additional water supply for said city, and did cause its said engineer to prepare proper, full and accurate specifications, proposals and directions relative to such construction in a printed form specifying the requirements of said board, the methods in which the work contemplated was to be performed, the character of the materials required to be furnished and the tests to which said materials were to be subjected; that said executive board did give full, legal and proper public notice as required by the statute in such case made and provided to all persons desiring to bid upon the aforesaid contracts, designating therein the time and place, to wit, December 23, 1892, at the office of the executive board in the city hall of said city, to the effect that each and every bid upon the several contracts proposed, should be enclosed in a sealed envelope addressed to said executive board, and so sealed and addressed, should be delivered to the clerk of said board, and after said proposal had once been so delivered the same could not be withdrawn; that said notice further required of all persons making bids for said contracts that the prices for every separate item of work named in said proposal should be plainly and distinctly written in ink, both in words and figures, in the proper blanks left therefor; that said complainant's engineer received all communications and explanations requested by him from said executive board and its engineer, and all the plans, specifications and information were at the complainant's command before its submission of the proposals for said contract.

Said defendants further allege and state the fact to be that on account of the treacherous subsoil disclosed by borings along said route A, and the more favorable soil disclosed along said
23 route B, in contract No. 2, the latter route would be the less expensive, and that the prices complained of in the complainant's bill of complaint were reasonable and fair values of the work set forth therein, and said defendants deny that any clerical error or mistakes were and are contained in said proposals.

Said defendants further allege and state the fact to be that if said items complained of in said route B, are less than the average amounts bid by the competitive bidders for said contract, the amounts were knowingly and intentionally so inserted by complainant's engineer, with the intent and purpose to make for said complainant a bid known as an "unbalanced bid," to wit, in which the contractor will give a low price for one kind of work or material and an unusually high price for another kind or work or materials in the same contract with the hope that the quantity of work or

materials for which a low price is bid will be reduced while the quality of materials or work for which a high price is bid will be increased, thus making up on the high price bid sufficient to give the contractor a large profit upon the whole work; said complainant did bid upon some items in said contract No. 2 a price far in excess of a reasonable price for the same, thus making said bid for said route B, contract No. 2, an unbalanced bid, enabling said complainant to realize upon the completion of the work far in excess of the amount based upon the estimates of defendants' engineer.

Said defendants further allege and state the fact to be that in pursuance of the notice to contractors accompanying the proposals for said contracts said executive board did award to W. H. Jones & Sons, contract No. 1, they being the lowest bidders for the same, and to this complainant contract No. 2, it being the lowest bidder for the same, and deny that said award of said contract to said complainant was
24 made by said executive board with the intent to take undue, improper and unconscionable advantage of the form and manner in which its proposals for said work under contracts Nos. 1 and 2 were presented to said executive board, or that said executive board acted in bad faith and awarded said contract for the purpose of taking an unfair, undue and unconscionable advantage of the alleged clerical errors claimed to have been committed by the engineer of said complainant.

Said defendants further allege and state the fact to be that on the 12th day of December, 1892, and by the resolution annexed to the complainant's bill of complaint (marked Schedule B), said executive board duly and legally awarded to said complainant the contract for the construction of the conduit by route B, in contract No. 2, and that said complainant was duly notified to attend at the office of said executive board with its sureties to execute said proposed contract, and that said complainant, without sufficient reason or excuse and with intent to defraud said defendants, did refuse and neglect to enter into said contract, and said defendants deny that said complainant is entitled to the relief, or any part thereof, in the said complaint demanded, and they respectfully submit that the injunction awarded against them by this honorable court on the 15th day of February, 1893, ought to be dissolved, and that the said bill ought to be dismissed, with costs.

THE CITY OF ROCHESTER.
RICHARD CURRAN, *Mayor.*
THE EXECUTIVE BOARD OF SAID CITY.
JOHN U. SCHROTH, *Chairman.*
C. D. KIEHEL,
Solicitor and of Counsel for Defendants, Rochester, N. Y.

25 UNITED STATES OF AMERICA, } ss:
Northern District of New York, Monroe County, }

On this 3d day of November, 1893, before me personally appeared Richard Curran, the mayor of the city of Rochester, one of the de-

fendants above named, who, being by me duly sworn, deposes and says that, the is the present mayor of said city of Rochester; that he has heard read the foregoing answer and knows the contents thereof, and that the same is true to the best of his knowledge so far as concerns the acts and deeds of said city and himself, and so much thereof as concerns the acts and deeds of any other person or persons, he believes it to be true.

RICHARD CURRAN.

Subscribed and sworn to before me this 3d day of November, 1893.

CHARLES P. LEE,
[L. S.] *Notary Public.*

The complainant thereupon filed a replication in the usual form.

UNITED STATES OF AMERICA,
Northern District of New York, Monroe County, } ss:

John U. Schroth, being duly sworn, deposes and says that he is the chairman of the executive board, a department of the city of Rochester, and one of the defendants above named, and is familiar with the business of said board; that he has heard read the foregoing answer, and knows the contents thereof, and that the same is true to his own knowledge except as to those matters which
26 are therein stated to be alleged upon information and belief, and as to those matters he believes it to be true.

JOHN U. SCHROTH,
Chairman Ex. Board.

Subscribed and sworn to before me this 3d day of November, 1893.

CHARLES P. LEE,
[L. S.] *Notary Public.*

United States District Court, Northern District of New York. In Equity.

MOFFETT, HODGKINS & CLARKE COMPANY
against
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester.

Testimony on behalf of the complainant, taken under and pursuant to the 67th rule of the supreme court as amended, before Stuart Taylor, Esq., a notary public, pursuant to stipulation, at the
27 city of New York, March 10th, 1894, pursuant to notice duly given.

Appearances.

Louis Marshall and Joseph Mullen, Esqs., for complainant.
C. D. Kiehel, Esq., for all the defendants.

EDWARD H. BURLINGAME, called as a witness in behalf of the complainant, being duly sworn, testified as follows:

Direct examination by Mr. MARSHALL:

Q. Where do you reside?
A. Providence, Rhode Island.
Q. What is your occupation?
A. Civil engineer.
Q. And your age?
A. 57.
Q. How long have you been a civil engineer?
A. Since about 19 years of age; I began at 18 or 20—37 years.
Q. What experience have you had as a civil engineer?
A. A very mixed one—railroad work, water works, city work, municipal work.
Q. Have you participated in the construction of water works?
A. Yes, sir.
Q. And also railroads?
A. Yes, sir.
Q. What was your employment in the year 1892?
A. In the early part of 1892 I was engaged in finishing the water-works system at Peoria, Illinois. In June, 1892, I came to New York and had charge of the general engineering for Moffett, Hodgkins & Clarke Company.
Q. The complainant in this action?
A. Yes, sir.
Q. Well, what work did you do?
A. For them?
Q. Yes?
A. During that time I was part of the time engaged in examination and surveys for the full supply of Jersey City, and other
28 things during the time. It was partially built—finished—during that year; some of the water-works work at Carthage;

I also had charge of the railroad construction for the Gouverneur and Oswegatchie road, and in charge of all the general work of the firm standing over—fifteen different plants that were improved and changed in various ways during that period.

Q. How long had you been in the employment of the Moffett, Hodgkins & Clarke Company in one way or the other?

A. For that time for over seven years.

Q. Moffett, Hodgkins & Clarke Company was a corporation?

A. Yes, sir.

Q. Organized under the laws of New Jersey?

A. So I understand.

Q. Who were the officers of that corporation?

A. J. F. Moffett, president; J. V. Clarke, treasurer; H. C. Hodgkins, vice-president.

Q. Who was the engineer who had charge of the engineering of that corporation?

A. Mr. Hodgkins.

Q. Were the others practical engineers?

A. Not to my knowledge. Mr. Clarke, I will say, I believe is an engineer, but practically I know nothing about it. He had no connection with the engineering operations of the firm.

Q. What were his duties in the corporation?

A. Treasurer.

Q. Had charge of the finances?

A. Had charge of the financial portion of the business.

Q. And Mr. Moffett, what did he attend to?

A. J. F.?

Q. Yes?

A. General business.

Q. He was not an engineer?

A. No, sir.

Q. During the year 1892 was Mr. Hodgkins actively engaged in the work of the corporation?

29 A. He was not; he was incapacitated by illness most of the time except for a little time in the early summer.

Q. Will you state what the nature of his illness was during that time?

A. I can state not from actual knowledge, but if I understand, he was during the summer suffering from an attack of appendicitis.

Q. So that he was entirely disqualified during the latter part of 1892 from doing any work?

A. He was unable to attend to any work from some time, I think, in July until late in the fall. He came to the office for a few times, but took no active charge of anything. I was appointed chief engineer in the firm probably for that reason.

COUNSEL FOR DEFENDANTS: That was in 1892?

The WITNESS: Yes, sir.

Q. Up to that time Mr. Hodgkins had sole charge and supervision of the engineering department?

A. The general engineering department of the firm.

Q. Of the corporation you mean?

A. The corporation I should say.

Q. And when any bidding was done or work was to be done who had charge of the preparation of specifications or bids?

COUNSEL FOR DEFENDANTS: When—before you were there?

Mr. MARSHALL: No; before he became engineer he was connected with it.

A. Bids were generally prepared——

COUNSEL FOR DEFENDANTS: If you don't know of your own knowledge don't say.

A. I will speak so far as my knowledge is concerned of work I was concerned in. I always made my own calculations and submitted them to Mr. Hodgkins before the final action was taken upon them. We generally used to consult together; beyond my own experience and my own work I know nothing.

30 Q. But up to the time when you became chief engineer had you ever made any bids for work except under the supervision of Mr. Hodgkins?

A. No, sir. I would modify that, however, by saying this. I can't say that the bids were sent to the office. Sometimes personally I was unable to meet Mr. Hodgkins, and they were left at the office ostensibly for his examination.

Q. They were left at the office for his examination?

A. Yes.

Q. During the fall of 1892, particularly during the month of December, 1892, what can you say as to the condition of affairs in the office of Moffett, Hodgkins and Clarke Company so far as their engagements and business is concerned?

A. Mr. Moffett was absent from the office most of the time.

Q. Do you know what he was engaged in?

A. I think he was in Chicago, though I did not attempt to locate him particularly. My impression is that he was on some company business in Chicago, but of that I am not convinced. Mr. Hodgkins had at that time been able to come to the office for a few times, but not practically to attend to business.

Q. And do you know what Mr. Clarke was principally engaged in at that time?

A. No, sir; I don't.

Q. Will you refresh your recollection—the Jersey City water-works matter?

A. Yes, the Jersey City matter—that did occupy a large amount. Now, I remember, as you recall it, Mr. Clarke being absorbed in that, and my own time was largely taken up with it at that period.

Q. Will you state what the nature of the work was you were engaged in with respect to the Jersey City water-works matter?

A. It was an examination of the whole water-shed connected with the water-shed of one branch of the Passaic river, investi-

31 gation of the flow of that river, surveys for reservoirs, storages for distributing reservoir, calculations for a conduit, and other work in various ways connected with that.

Q. Interviews with public authorities?

A. Mr. Clarke took charge of that end of the business largely.

Q. But you had charge of the engineering?

A. I had charge of the specific engineering.

Q. Can you give us an idea of the extent of the work contemplated?

A. The work contemplated the building of a stone masonry dam at Old Bulton a height of 85 or 90 feet; a storage reservoir on the Upper Rockaway covering 600 acres; the raising of one dam upon a branch of the Rockaway at Dixon's pond to the height of 47 feet; and provisions for making use of Gleen pond and Lake Delmont—dams wanted at this point, and then the building of a main line of conduit 28 miles.

Q. Tunnelling the mountain?

A. Tunnelling the Hook mountains and the mountain back of Paterson.

Q. In reference to draining the water—sewerage?

A. Yes; there were other plans for taking off the sewerage of Dover, Rockaway and Upper Bulton—anything that interfered with the purity of that water supply. It was a very complicated thing.

Q. It was a complicated system designed for the supply of Jersey City with 50 million gallons a day. What was the amount of money involved in that contract?

A. Between three and a half and five millions, depending upon the methods employed and the extent to which the work was carried. We thought the expense to complete it would be in the neighborhood of five millions.

Q. The work was very exacting and distracting, wasn't it?

32 Counsel for defendants objects to the question.

Mr. MARSHALL: I waive that question.

Q. What was the first information you had as to the intention of the city of Rochester to build a new pipe line or conduit line for its water works?

A. The first definite information was the advice of the "Engineering News." I can't recall the date. It was the week before the letting of the contract—about the 10th or 12th December; somewhere in that vicinity.

Q. Who called your attention to that advertisement?

A. I don't remember. I always read the "News" and look those things over. It was talked about in the office, but whether I noticed it first or not I can't say.

Q. Were you detailed to perform any duty with respect to the preparing of bids for the work described in this notice?

A. I was instructed to go there and look over the ground.

Q. Where?

A. Rochester, and examine the ground, and make out a bid for the work if I thought it worth while.

Q. When was that that you were so instructed?

A. It was, I think, on the Saturday before—the bids were to be let the next week. The day I am rusty upon. I don't remember those dates.

Q. Where was Mr. Hodgkins at that time?

A. I had seen Mr. Hodgkins. He had been at the office either Friday or Saturday, and we talked the matter over. I asked him if he would go; he said he could not go.

Counsel for defendants objects to the conversation.

Conversation stricken out.

Q. What was his condition of health at that time?

A. He was unable to go. His condition would not allow him.

33 COUNSEL FOR DEFENDANTS: I submit that is not proper, and move that it be stricken out as a conclusion.

Answer stricken out.

Q. He did not go?

A. He did not go.

Q. What did you observe as to his condition of health at that time?

A. That he was unable to attend to business generally.

Q. Was he feeble?

A. He could come to the office for an hour or so. He could not stay; he would go back.

Q. He has been in bad health ever since, has he?

A. Yes, sir.

Q. He has not done any active work?

A. He has done no active work since a year ago last July.

Q. What did you next do after this interview which led to your going to Rochester?

A. I went to Carthage on Saturday night—Friday night or Saturday night—to inspect the work that was going on there. On Sunday I drove to Gouverneur, and on Sunday night I left Gouverneur for Rochester.

Q. When did you arrive there?

A. Monday morning.

Q. Was it midnight, wasn't it?

A. Some time in the night. I took the night train from Syracuse.

Q. Prior to that time did you have any blanks for filling in your bids upon that work?

A. I had received one or two—the first—I think the first one. I was no farther than the first two—whether the one or the two before leaving New York I am unable to say.

Q. You mean the contracts, contract No. 1 and contract No. 2, as they will be termed hereafter in this record?

A. Yes.

Q. There were four different blanks?

A. There were four blanks, four sets of specifications for four branches of the work, or alternate styles of work—kinds of work—different kinds of work.

34 Q. Did you receive them all at one time or in sections?

A. No, I did not get them——

Q. Did not get them how?

A. Together.

Q. Contracts 3 and 4 related to laying and furnishing cast-iron pipe?

A. These I did not receive in time to make any figure or calculation on.

Q. I have correctly stated what contracts 3 and 4 related to—the laying of cast-iron pipe?

A. Yes, sir.

Q. You did not repair then any bids for them?

A. No, sir.

Q. For what reason?

A. I had no time after receiving the plans and specifications—these specifications.

Q. Contract No. 1 related to what?

A. To the first section of the work, almost wholly in tunnel from the connection to Hemlock lake.

Q. Masonry tunnel?

A. Yes.

Q. Contract No. 2 related to what?

A. To the laying of steel pipe from the termination of the section covered by the contract No. 1 for distributing reservoir with alternate routes.

Q. What were those routes denominated?

A. "Route A" and "route B."

Q. What was "route A"?

A. "Route A" was a more direct line following the valley of the Honeoye creek.

Q. "Route A" then, as I understand, was located in the alluvial flats through which the creek flows, and involved several crossings of the existing and former channels of the creek?

A. Yes.

Q. And "route B" was situated on the west side of Honeoye creek and required the construction of a tunnel, with the necessary shafts, inlet and overflow chambers, manholes and other appurtenances?

A. It did.

35 Q. What was the length of the line which was contemplated to be constructed by contract No. 2?

A. The length from section 1 to the——

Q. The total length of the line from the inflow of the Hemlock lake to the city of Rochester?

A. Can I refresh my memory by reference to notes?

Q. Yes, sir. Well, it is about 140,000 feet steel conduit, wasn't it?

A. I can tell by reference; I don't trust my memory in this thing—140,000 feet.

Q. And what portion of that 140,000 feet was identical in routes A and B?

A. All excepting—the only difference was the space where route B deflected from the main line for this tunnel.

Q. That was about 8,000 feet in length?

A. Yes, sir.

Q. So that in contract No. 2, 132,000 feet of the line was identical in routes A and B?

A. The same.

Q. And the only portion, therefore, of the entire line as to which there was any difference in the two routes was this 8,000 feet of this line?

A. This deflection of 8,000 feet for the proposed tunnel to avoid the flat.

Q. So that, so far as the earth excavation was concerned, it was practically the same excavation that was contemplated under routes A and B?

A. The same thing.

Q. After you got to Rochester—I think it will not be disputed that the day of the week you mention was the 19th December, 1892?

A. Reference to the dates has gone from my mind. Perhaps I have the date here in my notes. Friday was the 23d December, 1893. The 19th was Monday. I got there between Sunday night and Monday morning some time. Monday was my first day in Rochester.

Q. Your first day in Rochester was Monday, December 19th, 1892?

A. Yes, sir.

36 Q. And the bids were to be presented?

A. On Friday, the 23d.

Q. At what time of the day?

A. 12 o'clock.

Q. Will you state what you did after you reached Rochester on the 19th December?

A. I spent the day in the office of Mr. Kinchling looking over these plans and spelling over the matter as near as I could.

Q. Who was Mr. Kinchling?

A. He was chief engineer of the water works. I don't know what his actual title was; he was chief engineer of the water works—I suppose of the city.

COUNSEL FOR DEFENDANTS: Chief engineer of the water works.

Q. What conference did you have with him?

A. Merely examining the plans in his office and obtaining some data in relation to the work, with his assistants and with himself.

Q. What else did you do on that day?

A. That was all. That took the whole day.

Q. Before that when had you seen any maps of it?

A. I had seen nothing, knew nothing; the work was entirely fresh to me on Monday morning.

Q. Had you seen the specifications?

A. I had read one and two.

Q. When did you first get the specifications of No. 2?

A. The latter part of the week previous; Friday and Saturday I received them.

Q. I show you a pamphlet endorsed "Rochester water works, 1892. Notice of letting and form of proposal, contract and specifications for contract No. 2 for constructing steel-pipe conduit and

appurtenances for the city of Rochester, New York," and ask you whether that is the document which you received the latter part of the week previous to the letting (handing witness pamphlet)?

A. It is.

37 Q. Did you receive a similar pamphlet which relates to contract No. 1?

A. I did.

Q. And was that about the same thickness as this—as No. 2?

A. Generally about the some sized book.

Q. This pamphlet which relates to contract No. 2 has, in addition to several pages devoted to diagrams, how many pages?

A. 165.

Q. And the pamphlet relating to contract No. 1, in addition to the number of pages devoted to diagrams of masonry work, contained how many pages?

A. 97.

Q. Will you state from an examination of this book how many items and quantities of work were involved in the bidding upon route A of contract No. 2?

A. 61.

Q. Will you state how many items and quantities of work it was necessary for you to consider and bid upon under route B of contract No. 2?

A. 75.

Q. There was included in this pamphlet, in the proposal, a specification of each item of work and the materials which were to be furnished?

A. There were.

Q. The same is true of contract No. 1, is it not, as to there being a large number of items on which bids were to be made?

A. There were a large number of items; yes.

Q. Can you tell me how many items there were under contract No. 1?

A. 44.

Q. And the proposals comprehended the bidding of a gross sum for the entire work, or how was the bidding arranged?

A. It was arranged by quantities.

Q. Not a gross sum for the entire work, but a sum for each quantity?

A. Each work as may be increased and decreased by the actual demand and work itself.

38 Q. And there was also an estimate made by the engineer as to the probable quantity of each of the classes of work and materials which was to be required by the performance of the contract?

A. The amount of the materials to be used or handled was given in each case and the price carried out.

Mr. Marshall offers in evidence the pamphlets referred to by the witness.

Marked respectively "Exhibits '1 A' and '1 B.'"

Q. You have stated that you had an interview with Mr. Kinchling on the first day you were there. What did you do after that with reference to the preparation of bids?

A. On the second day I went over the line of the proposed conduit, the entire length of it, walked the length of it except five or six miles through meadows near the reservoir; we omitted that—accompanied with some of his assistants.

Q. Went over the ground with Mr. Kinchling's assistants?

A. Went over the ground proposed to be occupied, where the conduit was to be.

Q. What was the distance of that walk?

A. 140,000 feet.

Q. Had you ever been over the ground before?

A. Never had seen it before.

Q. Had you ever been in Rochester before?

A. Yes, sir.

Q. But you had not gone over the work?

A. Not been over the work at all. Had not been in Rochester or several years.

Q. How long did that examination take?

A. It occupied a whole day; we returned late in the evening.

Q. What was the next thing you did?

A. The next day was given to making up memoranda from which to make a bid, studying the bids, &c.

Q. Did you have any people to confer with with reference
39 to the prices of materials?

A. I saw some parties in Rochester with reference to some materials; some I could not obtain any prices for—materials that needed to be looked up along the line, and I did not have time, and did not succeed in obtaining any satisfactory information about.

Q. People who proposed to furnish the pipe?

A. With the pipe—I spent the larger part of this day in making up this memoranda of the cost of furnishing a pipe for this work—taken up almost entirely with that.

Q. Talked the matter over with representatives of various manufacturers of pipe?

A. Yes.

Q. The third day?

A. On the third day with representative of a firm at Syracuse.

Q. Mr. Stuart Wherland?

A. No, sir; the foreman—Mr. Rantan, of the Porter Manufacturing Company of Syracuse.

Q. How much time did you spend with him in going over figures and estimates?

A. From his arrival—from about nine in the morning, or early in the morning, till the middle of the afternoon.

Q. That required considerable calculation, did it?

A. Yes, sir, it required a good deal of calculation. They did not give us time enough as it was.

Q. Did you have other calculations to make besides those with respect to the pipe conduit itself?

A. Yes, sir, masonry calculations, and earth, timbering, &c.

Q. Give us an idea of the character of the calculations.

A. In the tunnel work it was necessary to consider these things that enter into the driving of a tunnel and the working of a tunnel, taking care of the water, taking care of the refuse material from the tunnel, the timbering, the character of the ground to be considered, and contingencies to be taken into account as to this—those
40 contingencies there having to be provided for. The cost of delivering material was to be obtained along the line, or to be estimated, where it could be obtained—everything of that sort pertaining to these different items that make up the contract.

Q. You made calculations as to all those matters?

A. Yes.

Q. In doing so did you have reference to the diagrams which are annexed to this pamphlet?

A. Yes, sir.

Q. Exhibits 1 A and 1 B?

A. Yes, sir; these were the basis of the calculations.

Q. What other calculations did you make besides those with reference to the tunnelling?

A. In reference to the earth excavation for the trenches, and the rock. The trenches were somewhat uncertain—very uncertain; from it being in the open part of the line a great deal of hard-pan or soft rock was included. I will correct that. The engineer recognized but two classes of material—earth and solid rock. There was a large amount of what is known among engineers as "hard-pan" and some of a kind of a soft rock which he declined to consider solid rock, and on which there was a chance for a great deal of difference in making up an estimate for the cost of the work. That required a good deal of thought.

Q. His directions as to that matter were all indicated by the specifications which you had carefully studied and considered?

A. Yes, sir.

Q. So far as the contract and specification was concerned, did you also have to examine that carefully?

A. Yes, sir, it was part of the work of the day.

Q. In connection with your preparation?

A. It was inseparable; it was all connected together.

Q. In contract No. 2 will you state how many paragraphs there were in the specifications?

A. 326.

41 Q. How many paragraphs were there in the specifications of contract No 1?

A. 182.

Q. What did you do after you had made these various calculations, and a talk with these various gentlemen who were to give you information as to the price of materials, &c.?

A. That finished up the day on Wednesday, and on Thursday I was still at work upon this—making out my figures.

Q. Making your calculations?

A. Yes, sir.

Q. Your memoranda?

A. And was obliged to spend quite a part of the day on Thursday in trying to obtain prices in Rochester connected with mason-work and brick-work for which I did not obtain any satisfactory prices anywhere.

Q. Your purpose was to ascertain the local market value of labor?

A. Of labor and material that went into this construction. It varies with every place where work is done.

Q. And in the absence of information on that subject what did you do?

A. I did the best I could. I figured upon what I could do it for in other places—what I had been doing.

Q. That related principally, I suppose, to contract No. 1—with reference to the mason-work.

A. Yes, partially; No. 2 had some of the masonry in that tunnel. On the item of hauling, which is a large item, and work of that sort I spent considerable time without much satisfaction to myself.

Q. Describe how you made your various memoranda?

A. These memoranda were made and left on Thursday night. I had intended to close the whole business, but was waiting for a set of the blanks with an executed bond to be attached. The bond was to be attached to this, and I did not want to make out a set until I made it out permanently, and Mr. Moffett was to be there. I wished to consult with him before taking the chances on
42 some things, before filling the blanks, not in an engineering point of view, but simply to know his views concerning the price and margin it was safe to work on. Those blanks did not reach me, and Mr. Moffett did not reach there until Friday morning.

Q. The day on which the bids were to be submitted?

A. To be opened.

Q. When Mr. Moffett came did he bring you this document, Exhibit 1 B (handing witness exhibit)?

A. Either that or a similar one.

Q. That is it?

A. Oh, yes, that is it; yes, sir; but Mr. Moffett did not reach me until about 10 o'clock Friday morning.

Q. "Exhibit 1 B" exactly the same as "Exhibit 1 A," with the exception that from pages 38 to 47 were filled out and executed by Moffett, Hodgkins and Clarke Company and the American Surety Company, those pages being the bond required to be furnished by the bidder?

A. Yes, sir.

Q. All other pages were blank?

A. Yes, sir; it was not filled up at all; there was no time to enter them.

Q. It had been your purpose to enter your prices in this pamphlet, "Exhibit 1 B"?

A. Yes, sir.

Q. And the same is true with respect to contract No. 1?

A. Yes; the same applies to both—both in the same condition.

Q. State what was done after Mr. Moffett came with these documents.

A. Before he got there I found that there was only one way to have all the blanks ready, and at 9 o'clock I commenced upon the copies I had—between 8 and 9—and worked as rapidly as I could filling them up.

Q. Filling in the prices?

A. Filling in the prices; yes. When he came in it was too late to discuss anything with him and fill the blanks he had brought; so after half an hour's talk Mr. Moffett says—"Go on and fill it up."

43 Counsel for defendants objects to the latter portion of the answer, and moves that it be stricken out.

Latter part of answer stricken out.

A. (Continuing:) I did go on and fill it up as well as I could.

Q. You did fill it in under Mr. Moffett's instructions?

A. I filled it in. I would say that those fillings were made up from scattered memoranda, and I had not even time to check it in the least. I did not go over it—did not compare it with the memoranda I had. In fact, it was past 12 o'clock, a minute or two, when we entered the room of the executive board of Rochester.

Q. And up to that time you had been engaged?

A. I had been working every moment since I started on this that morning. Shall I state how they were presented?

Q. No; but what you did before you presented them; you were engaged in filling out these blanks?

A. Yes, sir.

Q. These blanks referring to the prices which you made for each of the items of work and quantities of material which were to be furnished?

A. Yes, sir.

Q. In route A will you refer to this proposal of Exhibit 1 A and Exhibit 1 B, and read the form of bid which was prepared which related to earth excavation in open trenches or pits?

A. "For all earth excavations in open trenches or pits, for the masonry and pipe conduit, entrance and overflow chambers, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and sheeting, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, bailings and draining and other incidental work. The sum of — per cubic yard."

44 Q. That is known as "subdivision D"?

A. Yes, sir.

Q. "Subdivision D, route A"?

A. Yes.

Q. Does subdivision D of route B, relating to earth excavation in open pits, in any respect differ in phraseology from subdivision D of route A relating to the same work?

A. It does not.

Q. They are in identically the same language?
A. Yes, sir.
Q. What was the quantity of earth excavation specified by the defendants in their notice for bids of earth excavation under route A?
A. 184,000 cubic yards.
Q. How much did they state the estimate to be of earth excavation under route B?
A. The same.
Q. It was the same work?
A. It was identically the same work.

COUNSEL FOR DEFENDANTS: He said the same amount.

Q. The same quantity?
A. The same quantity.

COUNSEL FOR DEFENDANTS: It was a different locality, wasn't it? The 8,000 feet was a different locality?

Q. So far as the earth excavation was referred to?
A. The same in each case; the same thing. I have it in my memoranda; the same thing in every respect.
Q. What was the amount as filled in in the bid as presented to the executive board for earth excavation, subdivision D of route A?
A. $.70 per cubic yard.
Q. How much was the amount which was filled in in the bid as proposed for the earth excavation subdivision D of route B?
A. $.50; that was our bid as filled in.
45 Q. You are familiar with the fair market value of earth excavation, are you, as an engineer?
A. I think I am. I am.
Q. You have done a great deal and bid for a great deal of it?
A. Yes, sir.
Q. Know the prices paid for it?
A. Yes, sir.
Q. In various markets?
A. For forty years.
Q. What was the fair market value of the work described in subdivision D of route A and route B of contract No. 2?
A. The market value of it was what I had given in route A—$.70.
Q. The fair market value?
A. Yes, sir; $.70 to $.75—$.70 was a low value for it.
Q. What do you say as to the price—$.50 a cubic yard—being a sufficient price for it, a sufficient compensation for it?
A. I would not take it at $.50. It could not be done for $.50. With the kind of material there was there it could not be done for $.50.
Q. Will you state how it happened that you filled in the blank, subdivision D under route A, at $.70, and the blank subdivision D of route B, at $.50 per cubic yard?

A. In making up this estimate, as I said previously, there were pencilled memoranda, and among other calculations that this work ordinarily would be worth $.50 a yard where there was nothing to be considered beyond earth or medium excavation; but making the addition in it for hard excavation, $.70 was as little as it could be done for a yard. In the first route A, I had laid that aside altogether, and in the hurry took the $.50 without considering what it applied to; it was merely mechanical. In copying I took the wrong memoranda, that was all. There was no intention——

Q. Was there any intention on your part to make any difference in the price paid for earth excavation under subdivision D of routes B and A respectively?

46 Counsel for defendants objects to the question as incompetent and immaterial.

A. There was none.

Q. Will you state as to whether or not what your nervous condition was on the morning of that day on which you filled out these blanks?

A. I was overcome very much with it, and nervous over the delay about the matter, and also the trouble which I had had in getting things together; Mr. Moffett's slowness in appearing. The magnitude of the work seemed to me that it demanded more time than I had to make the bids in; and I was in that condition that I was not fit to make a bid.

Q. Was your mind confused?

A. Yes, sir; I don't like to acknowledge it; in the haste to finish it up, knowing that there was danger in not getting to the room in time, and the general confusion in which the thing was, I was not fit to make the bid.

Counsel for defendants moves that the portion of the answer, "I was not fit to make the bid," be stricken out as not being evidence, and as incompetent and immaterial.

Q. What do you mean by saying you were not fit to make a bid?

Counsel for defendants objects to the question as incompetent and immaterial.

A. Well, I was in a nervous condition; that is all.

Q. Did I understand you to say that in making this bid of $.50 per cubic yard for earth excavation under subdivision D of route B you made a mistake?

A. I did.

Q. And that that bid was made unintentionally?

A. That was unintentional.

Q. And your purpose was to make a bid of $.70 per cubic yard?

A. Yes, sir.

Q. What other mistake did you make in the bid as presented as relating to route B?

47 A. For hauling the earth excavation in the tunnel I carried out $1.50 without considering anything except the mere moving of the earth. The bounds of the calculation or the allowance for the work necessary to remove the earth was ten times the amount of the mere excavation, and this was left out entirely.

Q. What was it your purpose to bid for that work?

A. It should have been $15 instead of $1.50. There was no sense or reason in $1.50.

Q. What was the fair market value of the earth excavation in tunnel as described in subdivision H of route B of this proposal?

A. The fair price for it with ordinary working would be from $8 to $10. It would be as much as I intended to put in, but there was contingencies to be allowed for which I intended to cover.

Q. What do you say as to the sufficiency of $1.50 per cubic yard?

A. It would merely hand the dirt into the cars and keep the work moving without any allowance for any work preparatory for it or connected with it.

Q. Could you have it done for $1.50, or anything like that?

A. No, sir.

Q. The quantities stated in the advertisement of cubic yards of earth excavation in tunnel for masonry contract was 2,000 cubic yards?

A. Yes, sir.

Q. And your intention was to bid $15 a cubic yard?

A. Yes.

Q. That to cover all contingencies and give a profit?

A. Yes.

Q. What experience have you had in earth excavations in tunnels?

A. Back in the sixties I was in charge of tunnel-work, including both rock and earth excavation, in Schoolville coal-fields, Pennsylvania, for four years, and between 1880 and 1883, or one of
48 those years, had the entire charge of the construction of the tunnel under the Hudson river, at this point here, between Jersey City and New York, which is wholly in earth or in silt. Those have been my main experiences in tunnel-driving.

Q. So that you were well acquainted with the cost and value of work of that sort?

A. Yes, sir.

Q. So that in making your proposal of $1.50 it was purely a mistake on your part?

A. A mistake entirely.

Q. Not at all intentional?

A. It was not intentional, no.

Q. After you had completed the filling in of these various proposals of contracts 1 and 2 what did you do with them?

A. They were tied together—rolled together with the contracts and blanks that Mr. Moffett brought.

Q. Containing the bond?

A. Containing the bond, and submitted together, fastened in that loose way, I think, with a rubber band—tied together in some way.

Q. Were they put in an envelope, do you know?

A. We had no envelope; it was not an envelope. They were rolled up in a piece of brown paper.

Q. What was done with them after you had rolled them together?

A. They were taken to the room and handed to the clerk of the board.

Q. For the city of Rochester?

A. Yes, sir.

Q. And the defendants composing the executive board of the city of Rochester were present at that time?

A. So far as I know.

Q. Mr. Aldridge, Mr. Barnard and Mr. Schroth?

A. I remember Mr. Aldridge, and understood that the others were there.

Q. Who went with you at that time?

A. Mr. Moffett.

Q. Do you remember anybody else present at the time?

49 A. There were present R. D. Wood & Co.'s general agent, I can't recall his name. I will think of it later. There were also present Mr. Porter, of the Carroll-Porter Boiler Manufacturing Company of Pittsburgh. He and the representative of R. D. Wood were the only gentlemen of my acquaintance present.

Q. Beside Mr. Moffett?

A. Yes, sir. Garrett is the name of the representative of R. D. Wood & Company who was present. With him was another representative of theirs, but I cannot recall his name.

Q. To whom did you deliver these bids?

A. To the clerk.

Q. Mr. Neville?

A. Yes, sir.

Q. Were there other bids presented at the same time by other people?

A. There were.

Q. Do you remember the names of some of the people?

A. I can give them from my memoranda here. Rochester Construction Company, N. L. Bayer & Co., W. H. Jones & Son, Whitmore, Rauber & Vicinus, Chambers & Casey, and the Carroll-Porter Company of Pittsburg—that is not exactly the legal name, but that will do.

Q. What was done with the bids?

A. They were opened and read.

Q. Do you remember which was opened first, contract 1 or 2?

A. Contract 1 was opened first and read.

Q. Upon contract No. 1 the aggregate bids were—do I correctly state them—W. H. Jones & Co., Rochester, $292,518; Whitmore, Rauber & Vicinus, $385,997.50; Rochester Construction Co. $394,500; Carroll Porter Boiler and Tank Co., $400,146; N. L Bayer & Co., $415,967.50; Moffett, Hodgkins & Clarke Co., $473,790 is that correct?

A. Yes, sir.

Q. After the bids on contract No. 1 had been opened, will
50 you state what was done with reference to opening the bids on contract No. 2?

A. The bids of No. 2 were opened and——

Q. Whose bid was opened first?

A. Moffett, Hodgkins and Clarke Co. were read first.

Q. Before any other bids?

A. Yes.

Q. Will you state what occurred when that was read, and who read it?

A. Mr. Neville, the clerk, read it. In reading the second portion——

Q. After your bid was read what occurred?

A. In reading the second portion of the bid——

Q. That relates to route B?

A. Yes, sir; route B—and when the item of earth for open trenches was reached, 184,000 cubic yards at $.50, I immediately stopped the clerk, interrupted the clerk and said if it read $.50 it was a mistake—it was intended to be the same as in route A, $.70. I corrected that on the spot.

Q. What did he say?

A. Previously, the remark had been made that our bid was informal, that it was not worth reading—it was not to be considered anyway.

Counsel for defendants objects.

Q. Who made the statement?

A. One of the board of commissioners made that statement plainly.

Q. One of the executive board, you mean?

A. My impression is Mr. Aldridge.

Q. Did he state in what respect it was informal?

A. That it was not in the shape that the other bids were.

Q. Anything else said upon that subject?

A. Some explanation was made of it, and it was again repeated that it was informal, but that they would read it and see what it was. After I made this correction the clerk went on to read the bid.

Q. Then the other bids were read?

A. Yes.

Q. The total amount of the bid of Moffett, Hodgkins and
51 Clarke Company for the 38-inch pipe was $903,324; for the 40-inch pipe, $939,494; of Whitmore, Rauber & Vicinus for the 38-inch pipe, $1,123,920; for the 40-inch pipe, $1,164,900; of the Carroll-Porter Co. for the 38-inch pipe, $1,208,002; for the 40-inch pipe, $1,225,352; of the Rochester Construction Company for a 38-inch pipe, $1,331,885, and 40-inch pipe, $1,352,985. Is that correct?

A. Yes.

Q. Upon route B the total amount of the bid by Moffett, Hodgkins and Clarke Company for 38-inch pipe was $857,552.50; for a

40-inch pipe, $893,472.50; of Whitmore, Rauber & Vicinus, a 38-inch pipe, $1,130,195, and for a 40-inch pipe, $1,170,885; Carroll-Porter Co., 38-inch pipe, $1,215,382; 40-inch pipe, $1,232,612; of the Rochester Construction Company, 38-inch pipe, $1,349,935; for a 40-inch pipe, $1,377,735. Is that correct on route B?

A. I have not got the figures—yes, sir.

Q. What was bid by Whitmore, Rauber & Vicinus on route A for earth excavations?

A. $.75.

Q. Per cubic yard?

A. Yes.

Q. What did they bid for earth excavation under route B?

A. The same.

Q. $.75 per cubic yard?

A. Yes, sir.

Q. What was bid by the Carroll-Porter Co. for earth excavation under route A?

A. $.85.

Q. A cubic yard?

A. In both cases.

Q. And on route B?

A. $.85.

Q. Per cubic yard?

A. Yes.

Q. How much was bid by the Rochester Construction Co. for earth excavation under route A?

A. $.80.

Q. How much did they bid for earth excavation under route B?

A. $.80.

Q. There was not any rock excavation in tunnel under route A?

A. Not in tunnel.

52 Q. Under route B what was bid by Whitmore, Rauber & Vicinus for earth excavation in tunnel?

A. $15.

Q. How much by the Carroll-Porter Co.?

A. $12.

Q. By the Rochester Construction Company?

A. $12.

Q. $12 per cubic foot?

A. Yes, sir.

Q. Moffett, Hodgkins and Clarke Co., $1.50?

A. I suppose it is down. I have got it down here $15. That is the way it went on to the bid.

Q. Your item of $1.50 was inadvertent?

A. Yes, sir.

Q. And also your item of $.50 in earth excavation under route B?

A. Yes, sir.

Q. The error you made in each instance was a clerical error?

A. It was.

Q. What was the difference in dollars upon the quantities esti-

mated of earth excavation, estimated by the defendants, between $.70 per cubic foot and $0.50 on route B?

A. $36,800.

Q. What is the difference in dollars upon the quantity of earth excavation in tunnel between the price of $15 per cubic yard and $1.50 a cubic yard?

A. $27,000.

Q. Making an aggregate of——?

A. $63,000.

Q. $63,800?

A. Yes.

Q. What is the condition of your eyesight?

A. I am a little near-sighted.

Q. You are very near-sighted, are you not?

A. Sometimes, and sometimes I am not.

Q. Explain?

A. I am liable to some kind of an affection of my eyes. Sometimes they are a great deal worse than others; sometimes I am obliged to wear glasses, sometimes I do not.

Q. Usually you do not?

A. I do not.

Q. Were any of these mistakes you made attributable to your near-sightedness?

53 Counsel for defendants objects.
Question stricken out.

Q. Was your eyesight at all affected on that day while you were transcribing your memoranda into the proposals?

A. It was; if there is any nervous trouble my eyes are always worse—confusing nature.

Q. Were you at Rochester at any time after the 23d December, 1892, the day of the presentation of the bids, on this business, so as to have any interview with the members of the executive board?

A. I never had any interview.

Q. The bids on both of these contracts were put together in one packet?

A. Yes, sir.

Q. They were not separately put into separate envelopes, sealed and endorsed?

A. They were in one package—delivered together as one package.

Q. Then there was no separate envelope around each of these proposals?

A. No, sir.

Q. Nothing with the words, "Proposals for performing contract No. 1, Rochester water-works conduit," or for performing contract No. 2?

A. No, sir.

Q. Nothing of that sort?

A. No, sir.

Q. Will you describe what this mason-work was under contract No. 1? Was that for only part of the route?

A. Contract No. 1—that was the tunnel portion of it. That was at the commencement of the route, the in-take or commencing, just beyond the in-take from Hemlock lake, and extending through the high ridge there. It was the commencement of the conduit.

Q. So that contract No. 1 and contract No. 2 represent a continuous piece of work?

A. Yes, sir.

Q. What was your understanding on the subject of the two bids being really connected together as a single proposition to do the entire work?

Counsel for defendants objects to the question as incompe-
54 tent and immaterial, and as a conclusion of fact. If there is any information he received, or anything he can show in the papers to that effect, he can say it.

A. My understanding, as far as it went, was that the two went together. It was talked as one job.

Counsel for defendants objects unless the witness tells who talked it, and moves that the answer be stricken out as incompetent, immaterial and hearsay.

Q. Were you a stockholder in the Moffett, Hodgkins and Clarke Company?

A. No, sir.

Q. Did you have any interest in that concern at all?

A. No.

Q. Merely an employee?

A. Yes, sir; that is all.

Q. And were you paid a yearly salary?

A. Yes, sir; a yearly salary.

Cross-examination by COUNSEL FOR DEFENDANTS:

Q. How long a period were you in the employ of Moffett, Hodgkins and Clarke Co. before this work of the Rochester water works?

A. I was continually with them for seven years previously to this. My engagement with them dated back from October, 1885.

Q. And from that time you were regularly in their employ as their chief engineer?

A. No, sir; I was the chief engineer only during the last year.

Q. What was your employment before that time, from 1885 down?

A. In the construction of separate water works for them at different points in the country.

Q. That is, after the contracts had been let to them, you took charge of the construction?

A. The work was ordinarily contract work; it was ordinarily work for bidding on. The work I completed when I came
55 here was a piece of work involving an expenditure of a million and a half at Peoria, Illinois. I rebuilt that entire system.

Q. Which they had built themselves——?

A. They had.

Q. And then afterwards disposed of it if they got a chance?

A. No, sir; built it as they did the other works.

Q. If I understand you correctly, during the time you were with them they built or constructed water works and maintained and operated them?

A. Either one or both. At Jackson, Mississippi, I made the contract there subject to Mr. Hodgkins' approval, and built the work and turned over the proceeds to them. I did the same at Carthage, in this State. Those were two of the contract jobs done during the time by myself.

Q. And you had personal supervision of the entire work?

A. I had entire charge of the work.

Q. You made all the specifications and plans?

A. Specifications and plans. In the case of Jackson not one of the firm ever saw it—saw only the balance I returned into it when the job was finished.

Q. Was that the same fact with regard to the Carthage work?

A. Yes, sir.

Q. So in those particular works you did not consult with any of the company or officers of the company in the manner of construction?

A. After the plans were agreed upon by Mr. Hodgkins there was no further consultation with the company; the work was in my hands entirely.

Q. When you speak of Mr. Hodgkins having agreed upon the plans, what do you mean?

A. I mean that when plans of any contract were made during his active connection with the firm as their chief engineer I always consulted with him about it. The Carthage work was not. It came under my own control.

56 Q. And then after you became the chief engineer of course that consultation was abandoned?

A. Except so far as he was able—two or three times he was able—to hold a talk in his private chamber.

Q. But it was understood between you and the firm that you had exclusive charge of it?

A. Yes, sir.

Q. And if there was any consultation between you and Mr. Hodgkins it was purely accidental?

A. Yes, sir.

Q. How many people were employed by this company in their engineering department during the time that you were the engineer?

A. Do you want the names?

Q. Yes, if you have them.

A. A few. Eugene Carroll, in charge of the construction of Butte, Montana, water works, a job representing a million dollars; H. N. P. Dole, in charge of Carthage; E. W. Dewey, chief assistant; E. George Ferris, in charge of the construction of the Gouverneur and Oswe-

gatchie road; H. W. Tamkin, assistant engineer; L. W. Richardson, Jacob Harman. He is now city engineer at Peoria.

Q. Well, a man at that time?

A. Yes, sir. I don't think of others at present.

Q. Any draughtsmen that were in the employ of the company?

A. Mr. Tamkin. He was in charge of the drawing-room in the office.

Q. Have any assistant?

A. He had one assistant; I can't give his name; I don't remember his name. A man who was in charge of Butte and Callesville; those are all I recollect now. There are other men nominally at work subject to them, but not in active employment after I became chief.

Q. They could be called at any time?

A. Yes, sir.

Q. How many were there of them?

A. My son, who is now in charge of Clinton, Missouri, and
57 assistant on the work at Peoria. I will stop at that. I don't recall any other name.

Q. Were there any more whose names you can't recall who were nominally in their employ?

A. I say that I stop there.

Q. What do you mean by saying "I stop there"?

A. I don't have any more. These other men were in our employ.

Q. These men you have named as having charge of the different works in the different places were people in charge from the very beginning, were they not?

A. Yes, sir; generally. Sometimes they were put upon work after it had been started, if occasion required.

Q. And in this Rochester job you were sent to take charge of that, were you not?

A. No, sir.

Q. You were sent to make a bid, were you not?

A. Yes, sir.

Q. This Jersey City job that you have spoken of, was that making out plans and specifications for the purpose of receiving bids?

A. No, sir.

Q. What was it?

A. It was making out and submitting to Jersey City plans and specifications on which works would be built and the city to pay a certain price per gallon for the water furnished.

Q. You were then sent out by your company to make an estimate of the expense that you could build it for, for the Jersey City authorities?

A. Yes, sir—not for the Jersey City authorities, but to supply them with water at a certain price under conditions of construction that should be satisfactory to the city of Jersey City and their engineer.

Q. Did you have charge of that?

A. Yes, sir.

Q. Who else was with you in making this estimate and examination there?

A. In the first place Mr. Cook was concerned—E. W.
58 Cook—he was upon the work for a little while and went to Cleveland, Ohio; Mr. Dewey. Mr. Bandine was associated with me in a general way in the collection of some material and the making of some surveys, but it was mainly in my own hands.

Q. And you had been employed on that matter for how long a period

A. Since June, 1892, since I returned from Peoria.

Q. The work then by the 1st of December was principally done?

A. The work was done so far as to submit the matter to the Jersey City council.

Q. The work that was necessary during the month of December I suppose was more of work to see whether you could secure the job with the city authorities?

A. Well, I was concerned at the same time in and we were operating 47 plants, and I had every extension, everything that pertained to these different plants, come into the office for my supervision, examination and approval before anything was done.

Q. You had men in charge in every one of those places?

A. Certainly.

Q. And they simply made reports to you to the chief office?

A. Mainly maps, reports, but there were additions and extensions constantly asked for at different points.

Q. And you had people in your office that had charge of certain points that did the detailed work?

A. Yes, sir.

Q. And there were no reports coming in from this Jersey City job after the 1st of December?

A. The Jersey City job was such that every few days something was wanted concerning it.

Q. But the main work which devolved upon you as its engineer had been done upon the grounds by the 1st of December?

A. No more than Mr. Kinchling's work in connection with
59 Rochester was concerned. An engineer's work is never done until his work is constructed.

Q. There was nothing in Jersey City where there was to be anything definite in regard to a contract?

A. Don't understand you.

Q. They had not anything consummated so that the contract was to be let by the 1st December, or by the time that the Rochester matter came up; you were simply prospecting?

A. It was prospecting up to the time—I was trying to refresh my memory enough to tell you that bids had been received up to that time. I don't remember; I can't say, but as I said before there was not a week but there was some of this work pertaining to Jersey City in my office. It was not until long after this thing—it has been a complicated thing with a great many ins and outs.

Q. You can't remember when you first heard of this Rochester job?

A. I first heard of it when it was first published in the "Engineering News." No, sir, I can't remember when I first heard of it. I can remember when I got my specifications.

Q. Can you tell me when you got the first book or pamphlet from Rochester for this job?

A. 12th of December.

Q. 12th of December?

A. Yes, sir, that was my remembrance of it.

Q. You, of course, had written to Rochester for it before that?

A. Yes, sir.

Q. And this was received by you by mail from Rochester in answer to that letter?

A. Yes, sir.

Q. Do you remember what you wrote to Rochester?

A. What I wrote to them—how?

Q. What you wanted?

A. I wrote as I did where any bid is advertised asking for a copy.

Q. Can you tell me from recollection what the contents of that letter was, or what you asked for?

A. I asked for a copy of the specification.

60 Q. On the 12th of December, what did you receive?

A. I received one of those on one day and one the next. I said the 12th—that is my remembrance of it. It was not earlier than the 12th, and it might have been the 13th or 14th. They came, one following the other—a day apart at least.

Q. A day apart?

A. Yes, sir; my memory of dates is confused.

Q. And as soon as you received this pamphlet I presume you commenced to read it and examine it?

A. Yes, sir.

Q. And by Saturday, or by the 17th, which is Saturday of the week before the bids were opened, you had read both of the contracts, namely, contracts No. 1 and 2, and understood them?

A. I had read them. I don't say I understood them. You could not understand them until you were on the ground.

Q. You could not understand them both specifically?

A. Not for me to know what was to be done and what was wanted.

Q. But you understood what the work was that was to be done and what the materials were that were to be furnished?

A. In a general way. I could not tell what parties engaged in the manufacture of steel pipe would supply it for.

Q. You could, however, from the plans and specifications tell the work that was expected in the contract to do?

A. The general work.

Q. You could not tell what the prices would be that you would have to pay for the work and material that you needed?

A. Yes, sir.

Q. Otherwise you could fully appreciate what was contained in those pamphlet works?

A. I could understand in a general way what was wanted.

Q. Now, when you speak of a large number of items, are
61 those items in your opinion anything extraordinary in any way at all, or is that pamphlet in your opinion extraordinary in any way at all?

A. Is it extraordinary in some of its requirements?

Q. What do you mean by saying "in some of its requirements"?

A. In the requirement in regard to steel it is extraordinary—out of the ordinary.

Q. Tell me what you think is extraordinary in regard to steel?

A. The general specifications as regards the temper and constituents of steel.

Q. Is there anything extraordinary or unusual in open trenches and excavations in tunnel?

A. There is nothing extraordinary beyond this, that you can't determine anything about it until you have been over the ground.

Q. I don't ask you as to your capacity or ability to determine before you go upon the ground; I merely want to know whether there is anything extraordinary in the manner of specifying, or in the language of the contracts, or in the notice to contractors?

A. There is one point in relation to the excavation which is uncommon, and that is in the classification. There should have been three classifications instead of two—solid rock, loose rock or hard-pan, and earth or gravel.

Q. So you consider that the chief engineer in using the words "earth excavation," and including in that the hard-pan, as you term it, is the only thing which to your mind is of an unusual or extraordinary character?

A. I did not say it was the only thing.

Q. Well, what else is there if it is not the only thing?

A. I don't understand your relation to "extraordinary character." I say, and I can only make myself plain by saying, that the only way I could determine the character of that work, the work in the tunnel or the kind of excavation in the trenches, was to go on the ground and see it.

62 Q. I appreciate that, but what I want to know is whether in the statement of the different items there is anything unusual or anything ambiguous, or anything that you could not understand at the time that you examined and read the pamphlets—the printed pamphlets forwarded you?

A. Well, I certainly could not understand the character of that excavation of the trenches, as I said before.

Q. You mean by that that you could not tell the character of the ground before you went over it?

A. Yes, sir.

Q. Further than that you could fully appreciate it, could you not?

A. Well, that is a very broad term to say I could fully understand it. I don't know as I am able to say that.

Q. Tell me in what particular you could not understand it; I want to know something definite about it?

A. Well, I understood in a general way what he wanted done, but

I could not understand it definitely enough to make up my mind about it until I had been over the ground, and had seen it.

Q. To make up your mind about it in what particular?

A. In relation to the cost of it.

Q. But you understood fully what was wanted by the engineer in the several items, or rather as to the item of earth excavation in tunnelling, did you not?

A. I might understand what he meant by earth excavation, but I could not tell what the character of that earth was until I got there. There is all the difference in the world between earth excavation where it is simply earth and gravel, or excavation of a sliding clay or anything of that sort.

Recess.

Q. When you read subdivision *d* of B in contract No. 2, which reads as follows: "For all earth excavations in open trenches
63 or pits, for the masonry and pipe conduit, entrance and overflow chambers, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and sheeting, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, bailing and draining, and all incidental work," you understood fully what was meant by that?

A. Yes, I understood it.

Q. You understood it?

A. I want to qualify my answer. I understood this thing in the way that an engineer would understand it, but as to its details not enough to bid upon it.

Q. When you say "as to its details," do you mean that you have to acquire a knowledge of the local prices of this work?

A. No; a knowledge of the character of the work itself.

Q. Of the character of the work itself as it appears upon the grounds?

A. Yes.

Q. Otherwise you understood that fully?

A. Yes.

Q. Now, there was not anything in these specifications but what you could understand as fully as you could that item which you have read, so far as you now can recollect?

A. Well, I should reply in the same way as I did in the others.

Q. That you could?

A. With the modification of the details to be determined upon the ground; that is the only way I could answer.

Q. And those things which you designate "details" are the local prices and the location of the——

A. The location of the line and the character of the material to be encountered in the work.

Q. Is it not the fact that a great number of the items in either route A or route B of contract No. 2 are repeated in different forms?

A. They are.

64 Q. What proportion of them?

A. Perhaps that question could be answered by getting the difference in the items. I should say about one-third of them were changed. I could hardly tell; it requires to compare item by item to say. They don't follow the same in each case.

Q. One-third of the items in either route are a repetition of the other two thirds?

A. Yes, sir.

Q. That is the usual way of engineers to draw up specifications for the benefit of contractors, is it not?

A. Yes; work is very seldom let without specification.

Q. That is the usual way for drawing up specifications so as to meet every possible contingency?

A. Yes, sir.

Q. So when you speak of 61 items you do not wish to convey the fact that it is by any means complicated by reason of that, do you?

A. The more the items the more complicated. Yes; it is complicated by the addition of every item, no more so than every other specification.

Q. Do you wish to say that the specifications in this matter have made the work more complicated than it could otherwise be specified?

A. That is asking me to pass judgment on the specifications—whether they are more complicated than need be?

Q. Yes.

A. I don't know that they are. I did not say that they were.

Q. The first day that you arrived in Rochester was on Monday, the 19th, I believe?

A. Yes, sir.

Q. And you consumed that day by examining the plans in the office of the engineer?

A. Yes, sir.

Q. Did you make such an examination that you fully understood them?

A. Yes; I understood them so far—I should qualify it the same way—yes; I understood the plans.

65 Q. And the engineer and his assistants gave you all the assistance that was asked by you?

A. Yes, sir.

Q. And is it your opinion that you ought to have consumed more time in the examination of those plans than you did on that Monday?

A. Not necessarily.

Q. On the second day I believe you walked over the line?

A. Yes, sir.

Q. Where did you begin your walking?

A. I begin—I feel my memory fails me as to the station that is nearest the Rush reservoir.

Q. You began with the Rush reservoir?

A. No, sir; the nearest station to this proposed line.

Q. At Mount Hope?

A. I don't remember; I can't recall that station.

Q. Is it Mount Hope reservoir?

A. I don't know. I did not go to the reservoir; I went to the station nearest—where the engineer recommended us to commence the examination of the line; below that was through meadows and level ground where there was no special difficulty to be encountered in the work. But what was the name of the station I don't know.

Q. You mean a railroad station?

A. Yes, sir; a railroad station. We went up on the railroad.

Q. Red creek was it?

A. I cannot remember, although you might give the name. I am not familiar with it, but I know it. With the map at reach I could tell you where I was, otherwise I can't.

Q. Well, we will have the map at reach then. I have not got that map with me. You walked then from a station near Rochester to Hemlock lake?

A. I went up the line to the lake.

Q. And began at some station near Rochester, the name of which you cannot now remember?

A. Yes.

66 Q. Who was with you?

A. An assistant in the office.

Q. Was it Skinner? Describe the man if you can.

A. He was a short, small man.

Q. Thin?

A. Rather thin.

Q. Light complexion?

A. That is too much. He was one of Mr. Kinchling's assistants, and who had been over the line with other parties. He was short, but whether sandy or dark I don't remember. The engineer of the Rochester Construction Company was along, and his name I have forgotten—he is a man engaged in New York here on one of the dams of the Croton Co., I think—and Mr. Peck.

Q. In going over that route, I presume you saw all that it was necessary to see?

A. I saw all that I could in one day.

Q. Was it necessary to consume any more time in that particular work?

A. I don't know that it was.

Q. And you arrived at Hemlock lake in time to fully understand the location of the line?

A. Yes, sir.

Q. On the following day, which was Wednesday, you, I understand, were making up a memorandum to make a bid?

A. Most of the day with Rantan of the Porter Manufacturing Company of Syracuse. He was there and went with me over the steel manufacturing business. We took that whole day for it, nearly.

Q. And that was to obtain the price of steel pipes which were necessary for contract No. 2?

A. Yes, sir.

Q. You did not ascertain the price of anything else from him?
A. Oh, no.
Q. Did you consume the entire day?
A. Not all day with him particularly.
67 Q. How much of the day did you consume?
A. I think he left about three o'clock—two or three.
Q. What did you do after 3 o'clock?
A. Busy with the other part, with the other calculations.
Q. What particular part were you busy with after you left him?
A. I can't tell you—went over the whole thing. I took up the balance of it and went over it as well as I could.
Q. Give me what line or what particular part?
A. Starting with the first item and following through, whatever they were. I took them up consecutively as they came along. When I came to material I could not determine anything that could be obtained locally upon; I left that to be examined the next day, looked over the next day.
Q. These specifications are divided into the following main heads: First, the work on excavation——
A. There are two kinds of excavation.
Q. Well, I mean general? Second, the masonry; third, the cast-iron pipe; fourth, the vitrified earthenware pipe; and fifth, the appurtenances and appliances connected with the pipes; and sixth, the steel conduit pipe. Is not that a division of the entire specifications under general heads?
A. You could make it so, yes.
Q. Now, upon which of these heads were you engaged after 3 o'clock on Wednesday, if you can remember?
A. I can't remember.
Q. Can you tell me whether you made any inquiries in regard to the masonry work, the prices of it?
A. I did not go out of my room that afternoon after Mr. Rantan left. I was busy going over my own memoranda of the day before as to the character of the ground to see as far as I could what proportion of it was likely to be earth and hard-pan, together making the two things that were included under "earth," to see how far I had to haul the pipe from different stations and different
68 points to get to the line, how far other material was to be hauled from the data I obtained the first day; and with other matters of that sort, I don't think, as I remember it now, I went out of my room in my hotel that afternoon.
Q. So then you were engaged in figuring out your estimates upon the data that you received the day before, and those that you received from Mr. Rantan on that day?
A. Yes.
Q. Did you finish that figuring upon Wednesday?
A. No, sir; I had not finished it even Friday morning.
A. Well, I did not ask you that; I ask you with regard to this Wednesday?
A. No, sir.
Q. On Thursday what did you do?

A. I travelled over the city of Rochester pretty extensively.

Q. For what purpose?

A. Tried to obtain prices on masonry, brick, to see where brick could be obtained and delivered up there at different points where brick would be required; and vitrified pipe and other materials coming into this, and the general character of labor at Rochester and everything of that kind.

Q. What concern did you consult with upon that day for the purpose of ascertaining the prices of brick?

A. I can't give you a name there; I can't remember names anywhere.

Q. How many concerns did you call on?

A. I could not tell you.

Q. How much of the day did you consume in calling upon different firms for the purpose of ascertaining prices?

A. I was busy with it all day; I did not do any work in my room that day.

Q. Give me the time?

A. I can't do it.

Q. Can you state from what time in the morning until any time in the afternoon?

A. From the time I got my breakfast until supper.

69 Q. What time did you get breakfast?

A. I don't know.

Q. Did you consume the entire time from the time you got breakfast until supper?

A. I can't give you—for pity's sake, don't ask me any more.

Mr. MARSHALL: Answer as definitely as you can.

The WITNESS: I can't tell anything more than that.

Q. Can you tell me whether you consumed two hours or five hours for the purpose of ascertaining the prices of material and labor?

A. I can't tell you anything more than what I have said, that the day was used up in outside examination of this thing.

Q. Did you do any figuring up that day at all?

A. I did in the evening.

Q. How much time did you consume in the evening in figuring?

A. I went to bed, I think, between 11 and 12—most of the time.

Q. What time did you begin?

A. I don't know.

Q. Well, give me your best recollection.

Mr. MARSHALL: As near as you can state.

A. Well, I began as soon as I had finished my supper. I can't tell the time when that was. I spent an hour and a half of that time with some one who called on me at the hotel; it had no reference to it—but as to that I can't tell.

Q. An hour and a half with you after supper?

A. Yes, sir.

Q. That had no reference to this work at all?

A. No, sir.

Q. And did you receive any other calls during the day, or have any consultations, or spend any time with any other parties with reference to matters that did not concern this contract?

A. I think I stopped at one gentleman's office and did not
70 find him in, if I remember rightly—some such thing as that—I looked for him and could not find him.

Q. You can't give me the number of places you called upon that day, Thursday, for the purpose of ascertaining the data?

A. No, sir; I can't.

Q. Tell me what portions of the city you went to?

A. I don't remember where I went. I don't know very much about Rochester as far as streets or parts of the city are concerned. I simply went to parties that were given me as dealers or handlers of material, or men who would be apt to be familiar with the prices of the work. I never made any memoranda of those things, and I don't remember names. I met one man in the street here and don't recall his name, although I know him for 20 years.

Q. Tell me where you called upon these people, whether their offices were in Powers' building or any of the other buildings of the city, or whether you went into the outskirts, and give me the places you went?

A. I could not give you the places. As I remember now, I went to one stone yard, but I don't remember that name, and I can't tell you where it was. It was not a great way from Powers' hotel.

Q. Was it Brady's?

A. Yes, sir.

Q. Was it Plymouth avenue and the canal—Brady's stone yard?

A. I don't know where Plymouth avenue is.

Q. Do you remember it was not far from the hotel?

A. Yes, sir.

Q. How much time did you consume there?

A. I don't know.

Q. An hour or a half hour?

A. I can't tell.

Q. Your best recollection?

A. Well, call it an hour.

Q. No more than an hour?

A. I don't know.

Q. Where else did you call on that day? If you can't
71 give me the name, give me the place?

A. I can't give you those things. I have no memorandum, and I did not charge my mind with them at all.

Q. How far did you go away from Powers' hotel on that day in attempting to ascertain these values?

A. I can't tell you that. I have no means of measuring the distance.

Q. Can you give me any place that you went besides the stone yard that was near the hotel you have spoken of?

A. No.

Q. And you cannot state the names, or the fact that you called upon anybody else besides the stone-yard people?

A. I stated the fact that I did call at several places.
Q. Where are those places?
A. I state the same as I did before, that I can't tell you.
Q. When you speak of "several places" tell me how many you have in mind?
A. I have said all I can. I can't.
Q. Several may mean 10 and it may mean 2. I want you to give me your recollection of the number of places you called on?
A. Well, I can't give it to you.
Q. Have you any idea of the number?
A. No, sir.
Q. Were they as many as five?
A. I said I had no idea of the number, and I should think that covers it. I can't tell you.
Q. Tell me the business that the parties upon whom you called that day were engaged in?
A. I called upon stonemen, pipemen, vitrified pipe, lumbermen; I called upon men who had teams—hauling—brickmen.
Q. Anybody else?
A. Don't remember anybody else.

Q. Can you state now that you called upon anybody else
72 besides Brady for stone, or besides the one near Powers' hotel for stone, or for the price of stone?

A. I think I did—several houses.
Q. Who else?
A. I don't know.
Q. Well, how many more, then?
A. I don't know.
Q. Was it one more?
A. I don't know.
Q. Well, do you know whether you called upon any more?
A. Well, I don't know. If it is necessary for me to say "I don't know" all the afternoon I will go on.
Q. All right; I don't care what you say. Now tell me whom or how many you called upon for brick or vitrified pipe?
A. I have merely the general remembrance that I called upon them, and I can answer "I don't know" till night.
Q. Can you state as a fact that you called upon any one man for vitrified pipe?
A. Yes, sir.
Q. Who was it and where was it?
A. I don't know.
Q. Do you know whether you called upon more than one?
A. I don't know.
Q. Can you state the fact that you called upon any one person for lumber?
A. I did.
Q. How many did you call upon?
A. I don't know.
Q. Did you call upon one?

A. Yes, more than two. I have got to the end; I don't know any more.

Q. Then you have no recollection of calling on more than two men engaged in the business of lumber?

A. I have answered it before as plainly as I can; I don't remember how many.

Q. Can you say then——

A. I say I did call upon two, but how many more I don't know.

Q. You have no recollection of calling upon any more?

A. I have no recollection further.

Q. Have you a recollection of calling on anybody for teaming?

73 A. I called upon several men who were either owners of teams, or familiar with work.

Q. Where were they when you called upon them?

A. I cannot locate them.

Q. How many men have you now a recollection of calling upon who were in the business of teaming?

A. I could only say one or two men.

Q. Have you any recollection of more than two?

A. No definite recollection; might have been six; I don't remember.

Q. You have no recollection of more than two?

A. Nothing definite.

Q. Have you a recollection of the fact of calling upon anybody else upon any other business than you have testified to here?

A. I don't remember whether I did or not. I took everything I could think of as having any bearing on what I wanted to find out and went as far as I could to learn it, but where I went and whom I talked to I did not consider worth remembering.

Q. And I believe you have stated it is a fact that you cannot tell of any place that you went to except this brick yard outside of Powers'.

A. I can't tell you the name of a person to whom I went.

Q. No, no; the fact that you went to any place outside of Powers' hotel on that Thursday besides this stone yard.

A. I told you I went to several lumber parties and men engaged in brick. I thought I had said it as plain as I could.

Mr. MARSHALL: And people who did teaming?

The WITNESS: Yes, sir.

Q. That is all you can say about it?

A. Yes, sir.

Q. There were copies of this contract—of the blank form of contract left in New York at the company's office when you left on the 12th?

74 A. No, there were not. There were no blanks left there.

Q. Did you send any blanks from Rochester to them?

A. I don't know whether I sent them or whether they were sent—the application had been made and they were sent direct from Rochester.

Q. When were they sent, if you know?

A. I do not know. After I left—or at least they reached there after I left.

Q. Had you finished your calculations, or your figuring rather, on the night of Thursday?

A. I had gone over the whole ground. There were still some matters that I was uncertain what to do with or what price to put upon; and I had not tabulated or put into consecutive shape anything on this contract No. 2, and No. 1 was in rather a confused condition.

Q. The main figuring had been gone over, and the only thing that remained for you to do was to put your prices on the tabulated form and to consult with Mr. Moffett as to the prices that you had given?

A. Yes.

Q. Have him exercise his judgment in regard to it?

A. Yes.

Q. Now, were you in communication with the house in New York during your stay in Rochester?

A. I suppose—yes, I know I was in communication with them.

Q. Telegraphic or mail communication?

A. I was telegraphing them to hurry up this bond business, and my remembrance is that the telegram saying that Mr. Moffett would be there on Thursday night. I may be wrong.

Q. When did you telegraph to that effect?

A. I don't remember. I asked for him to be there whenever I did telegraph—I don't know.

75 Q. Do you remember when you asked him to be there?

A. I asked him to be there on Thursday. The date I was in was on Tuesday.

Q. Your recollection is that you received a letter from him—from somebody—that he would be there on Thursday?

A. That he was on his way.

Q. If Mr. Moffett had arrived on Thursday you would have been capable of doing those things and making those prices you were still undecided upon on Thursday?

A. It would have been done on Thursday night after I came in.

Q. So that the work that you really delayed was due to Moffett's delay and tardiness in not coming to Rochester in time?

A. That is the size of it.

Q. And when he did come on Thursday morning, of course everything was in a rush, inasmuch as you were obliged to be there by 12 o'clock Friday noon?

A. Yes.

Q. The blank form in which the bond was executed and the one in which the prices were put in were tied together by you, and in the one you specified that they should be read and considered jointly?

A. Yes, sir.

Q. And you submitted them for each contract jointly as one contract?

A. Yes, sir.

Q. The fact is, Mr. Burlingame, that in regard to excavations it is more difficult to ascertain the character of the excavations in the tunnel than it is in the pipe line?

A. My recollection of that tunnel line is that there could have been more borings made. I may be off on that, but that is my remembrance of it, and that the character of the material was determined somewhat from the borings. It was impossible in either case, it was a blind matter to judge with all the examination you could make of either the pipe line or the tunnel line, because you had so much in the pipe-line excavation of the character I arrived
76 at before, a sort of hard-pan and loose rock which did not show upon the surface.

Q. Do I understand you to say that it was quite difficult, more difficult to ascertain that character of the excavation in the tunnel contract than it was in the pipe-line contract?

A. It was not a great deal of difference about either one. As I said before it was blind excepting from the borings that had been made. Those borings determined as far as they went. We knew what was there—that is a pretty difficult question to answer. I don't know as I could say.

Q. There was as much information given to you on that subject as there is usually given upon matters of that kind?

A. Yes.

Q. And it was not more difficult for you to ascertain the character of the excavation than in any other contract?

A. The same, I guess, in either case when you are guessing below the surface.

Mr. MARSHALL: Where the excavation is in trench or in tunnel?

The WITNESS: Yes; your surface indications are not reliable.

Q. Route B was quite high ground, diverting from a straight line?

A. Yes, sir.

Q. Route A was the straight line, but went through a marsh or low land?

A. A meadow.

Q. On Honeoye creek?

A. Yes, several creek crossings.

Q. How many creek crossings were there?

A. I think it is specified there, five or seven.

Q. You look it up (handing witness paper).

A. Six crossings.

Q. The character of the excavation through the meadows known as route A was, so far as you could judge at the time that you walked along the line, liable to have considerable quicksand, wasn't it?

77 A. It was liable to have. There was nothing visible at the time.

Q. In making your estimates did not you take into consideration in route A that there was a possibility of quicksand through the 8,000 feet in Honeoye valley?

A. I made no special provision for it.

Q. Is not it a fact that you considered at the time you made these estimates or prepared this bid that the quicksands were liable to be in route A?

A. I considered there was liable to be quicksand there, but I did not consider it a very difficult matter to get over.

Q. And wasn't it your opinion that there was no quicksand in route B?

A. I don't think there were any quicksands there; I remember particularly about that—that there were any. I was thinking at the first part of that there was a liability to some, and I also have a faint recollection that quicksand had been struck on the borings on the line of that tunnel. I am very confident that my attention was called to the quicksand in the tunnel itself.

Q. Do you mean the tunnel in route B?

A. Yes, sir.

Q. How much of the tunnel was there in route B?

A. It was not very long; the amount of cubic yards is given; the account tells you that—the length.

Q. Was not the principal part of the excavation in route B open trench excavation?

A. No, sir, it was mainly in tunnel—route B after it left the other line until it came back to the other line there was a large amount of it. The proportion I cannot remember. The tunnel occupied a fair part of that line, and it was either in clay—the borings showed clay, and at one end they showed quicksand. They had not been close enough together to determine what the full material would be.

78 Q. And your recollection now is that quicksands were shown by the borings on route B?

A. At one point in that tunnel—that is my recollection of it.

Q. Can you state from the contract how much earth excavation in open trenches there was in route B?

A. The total?

Q. Yes, as you recollect it?

A. About 180,000 feet, the same as there was in the route.

Q. I mean that part of route B which alternates with route A?

A. No, sir.

Q. How much of that part of route B which took the part of route A was there to be tunnelled?

A. I cannot remember the distance. They are shown upon the plans.

Q. You had figured upon $.50 per cubic yard for open trenches excavation during your figuring for this contract, had not you?

A. I had figured that that was a fair price for doing ordinary earth and gravel excavation. That is what I had figured it. That estimate of $.50 was made without consideration of the extra work to be encountered in this bid—material which I spoke of before.

Q. Which you designated as hard-pan?

A. Yes, sir, loose rock.

Mr. MARSHALL: And the haul?

The WITNESS: Yes, sir, including all the items that go to make up the cost of handling that material.

Q. Did not you include in your figure of $.50 per cubic yard the haul?

A. The haul under 1,000 feet.

Q. And you considered the haul under 1,000 feet in the computation or in your figures for the loose-earth excavation and hard-pan, too, did you not?

A. No, sir, $.50——

Q. $.70 I say?

A. Oh, $.70 cents. Yes.

79 Q. So, then, the difference between the $.50 and the $.70 was the difference of cost by reason of hard-pan?

A. Well, I should include quicksand the same as hard-pan on the other end of the line.

Q. The quicksand, including the hard-pan?

A. No, but the hard-pan, including the quicksand. It is about as hard to excavate where there is quicksand as it is where there is hard-pan—very little difference in handling the material.

Q. Did you submit your figures to Mr. Moffett?

A. Not to go over them. We had no time to go over them after he came.

Q. After having written in your figures in the book, did you look them over at all?

A. No, sir, I had no time.

Q. Did you make any correction?

A. I think I had raised that $.50 to $.75.

Mr. MARSHALL: $.75?

The WITNESS: $.70.

Q. Where did you raise $.50 to $.70?

A. In route A.

Q. In route A?

A. That is my remembrance of it. If I did not raise it I had made it at $.70—had carried it out as $.50 for ordinary work and then made it $.70, and I think there was a correction made to that effect in route A.

Q. You had first inserted in subdivision D of route A $.50?

A. That is my remembrance.

Q. Wrote it out or spelled it out in figures?

A. I think so.

Q. And you had also written out in subdivision D of route B $.50?

A. The same as I had in the other.

Q. The same as you had in route A?

A. Yes, sir.

Q. That was done before you made the correction of $.70 in route A?

A. I don't think it was. I don't remember as to how. I don't think that I went over the last route B there. I don't think

80 I had time to compare it or check it with anything.

Q. Can you now remember when you discovered that $.50 in that subdivision of route A was not what you wanted?

A. The moment I wrote it. It was not enough. I changed it. It was not enough. I took the figure from my memoranda of $.50.

Q. The moment you wrote that you discovered you had not enough and put in $.70 in it?

A. Yes, sir.

Q. And did you fill out the both of the items in route A before you filled out any of the prices in route B?

A. My remembrance is that I did. I took it along.

Q. Took it along from page to page?

A. I think so.

Q. When you came to route D you wrote $.50 in?

A. Yes, sir.

Q. And left it that way?

A. Yes, sir.

Q. Did you know what subdivision D of route B was when you put in $.50?

A. I certainly knew what it was, but I have previously explained that I wrote this just as fast as I could take them from my memoranda, hurrying to get through, and put them just as they were originally on the pencil memoranda that had been made.

Q. When did you hear on Friday morning of the time that Mr. Moffett was to arrive in Rochester, if you heard at all?

A. I don't remember that I heard at all. I was waiting for him constantly.

Q. You waited for him, as I understand, until 9 o'clock?

A. Yes, sir.

Q. And then you concluded that you would make out these figures without him?

A. Yes, sir.

Q. Now, you made a mistake, as you claim, in item H of route B, which is earth excavation in tunnel, by inserting $1.50 per cubic yard?

A. Yes, sir.

81 Q. Do you remember how many cubic yards there were estimated by the engineer as earth excavation in tunnel?

A. 2,000.

Q. How did you make that mistake?

A. In figuring up the matter of appliances that were necessary, taking care of the water and everything in the tunnel, I had made that by itself. I came then to consider the handling of the material and I put $1.50 as ample for digging it out, the men digging it out. I went on and filled this up without paying any attention to the general calculation for the appliances necessary to drive that tunnel. As I read it over, $1.50 seemed a large amount to me, an amount enough for removing so much earth. I did not give the matter thought, and did not notice it until after the thing was over.

Q. As I have understood you in your examination here, the earth excavation in tunnel in route B is about the same as the earth excavation in tunnel in contract No. 1, is it not?

A. Yes, sir.

Q. The work in either is the same?

A. Yes, sir; about the same—a little more favorable perhaps in the larger tunnel than this because there is more work to be done.

Q. A little more favorable—you mean in contract No. 1 or 2?

A. No. 1.

Q. Don't you remember how many cubic yards of earth excavation in contract No. 1 was to be had?

A. 1,500.

Q. And you made a mistake in giving that estimate?

A. Yes, sir.

Q. You gave that as a dollar and a half a cubic yard?

A. Yes, sir.

Q. And the total amount you made for contract No. 1 was some $73,000 higher than the next highest bid, was it?

A. No, sir; $58,000.

Q. Is not the next highest bid $415,967?

A. Yes, sir.

82 Q. Then your bid for contract No. 1 was some $58,000 more than the next highest bid for that contract?

A. Yes, sir.

Q. And you claim now that you made a mistake in the price of $1 per cubic yard for "item I" in contract No. 1?

A. Yes, sir; I should have made that $10 instead of one. I did not discover that until I saw this $15. It was another mistake in that same one.

Q. Is there any other mistake that you made in contract No. 1?

A. Yes, sir; there is.

Q. What is the mistake that you made in that?

A. There is carried out here, brick-work, $27 a cubic yard. It should have been $27 a thousand. The calculation was all made on it, and instead of reducing the thousand to cubic yards it was left standing at $27 a thousand, and it should have been $18—two-thirds of that.

Q. That was a mistake that would have offset the mistake you made on earth excavation in tunnel?

A. No, sir.

Q. Would not it in part?

A. Small part.

Q. Is there any other mistake that you made in your bid for route B in contract No. 2?

A. I don't know; I will see. Except that same $27 carried out there. It was used straight along.

Mr. MARSHALL: You mean the brick?

The WITNESS: Yes, sir.

Q. Then you made the same mistake in brick masonry, Portland cement, tunnel and shafts, in route B of contract No. 2 that you made in a corresponding item of contract No. 1?

A. Yes, sir; the same figures are right straight through.

Q. The mistake in the item of brick masonry, Portland cement, tunnel and shafts would offset in part the mistake that you made

in item D of route B, contract No. 2—that is a mistake in the other direction?

83 Mr. MARSHALL: It would be only infinitesimal.

A. It is very small.

Q. Which means that the bid for the masonry is larger than its fair value and the bid for item D is smaller than its fair value?

A. Yes, sir.

Q. Have you ever heard of unbalanced bids?

A. Yes, sir, I have a great many times.

Q. You know how to make them, I suppose?

A. I never made them.

Q. I did not ask you that?

A. I don't know how, not practically.

Q. You know about them?

A. I know that they are made, and I know that in this case I had no intention of making anything but a straightforward bid; the mistakes, as an engineer, I am ashamed to own, and I am obliged to do it.

Q. These things I have called your attention to would be designated as unbalanced bids, would they not?

A. If there was anything to be gained by them I would. If there was nothing to be gained I don't know what object there would be in making an unbalanced bid.

Q. There are some other items there which are far above the value given by the other contractors, are there not? For instance, cut-stone masonry and copings; you give $50 a cubic yard, and the next highest bid only $40 a cubic yard; is not that so?

A. This is another——

Q. Is not that so?

A. My bid is the larger, and I doubt if any one of them could have put it in for less than $50; $40 to $45 would be the cost of it. In a bid of that size I would make this explanation, that such small items as that are seldom figured very closely where there is but a few of them to be considered.

84 Q. Is not it the fact that you as a skilled engineer are capable of judging the amount of work as well as the engineer who furnishes you with the specifications and plans?

A. What do you mean?

Q. The amount of work, the amount of excavation necessary?

A. Well, I don't understand you.

Q. Are not you capable of judging the amount of work by going over the grounds and taking the borings and taking the dimensions as well as the engineer who furnished you with the specifications and plans?

A. You mean that I could go there, and in one day satisfy myself as to a matter that a man with a corps of eight or ten assistants would take a year to determine.

Q. I mean from that data that he gave you, by the actual measurement whether you are not capable of judging, and whether it is not a fact that you do base your estimates upon your own judgment

rather than upon the judgment of the engineer who furnishes you with these specifications?

A. I base my estimate upon my judgment of the character of the materials, and take his quantities absolute. One day's examination could not have satisfied me whether his quantities were right or wrong.

Q. You wish to say then that you depended upon his quantities absolutely?

A. Yes, sir.

Q. Never exercised your judgment at all?

A. No, sir; in that case I did not question his quantities.

Q. You did not call the attention of the clerk, when contract No. 1 was read, to your mistake which you had testified to in regard to "item I"?

A. What is that?

Q. Earth excavation in tunnel?

A. No, sir; for I did not notice it.

Q. Did not notice it even then?

A. No, sir; I did not. I did not notice it when my bid was read for route B.

85 Q. And the only thing that you noticed and called the clerk's attention to, or the parties' attention to, at the time of the canvassing of the bids was the item of $1.50 per cubic yard for earth excavation in open trenches in route B, contract No. 2?

A. Yes, sir.

Q. You don't wish to say that by reason of your not using any glasses during the work that you made those mistakes?

A. No, sir; it was due to my confusion and hurry.

Q. You were considerably exercised by the fact that Mr. Moffett did not put in an appearance?

A. Yes, sir; and by the fact that the time was getting so near.

Q. And you got uneasy because you did not want to take the responsibility?

A. Yes, sir.

Q. And finally Mr. Moffett put in an appearance, and he came in so late you could not do justice to the work?

A. Yes.

Q. What facts were there or what information was there that led you to believe that these two contracts were to be let as one?

A. We had the general idea that the thing was going together, that there was a certain amount of work to be done, that one man could do the whole thing, or one concern, in better shape than if there was two or three hands; and merely taking it in a general way I supposed the whole thing would go together. I had no knowledge of it specially.

Q. You had received no such information?

A. No, sir.

Q. There was nothing to intimate to you from the papers that such was the case?

A. No, sir.

Q. On the other hand, there was a separate contract for contract No. 1 and for contract No. 2?

A. Yes, sir.

Q. And you were particularly requested in the notice to
86 contractors in each of the pamphlets to put your bids in an envelope, and address them to the executive board separately?

A. Yes, sir.

Q. And with all that information, and with all these facts before you, you still came to the conclusion that these two contracts were to be let as one?

A. I did not come to any special conclusion about it. I supposed.

Q. You received the impression then that these contracts were to be let as one?

A. Yes.

Q. You are not in the employ of Moffett, Hodgkins & Clarke Co. now, are you?

A. No, sir.

Q. When did you leave their employ?

A. Last August.

Q. Who have they employed since then?

A. I don't think they have employed any one.

Q. Why?

A. Not in existence.

Q. Have they gone out of business?

A. Yes, sir; at least they are in limbo—don't know what condition you would call it.

Q. Well, now, what does that mean?

A. Well, in the receiver's hands; we will put it that way.

Q. A receiver has been appointed for the company since then?

A. Yes, sir.

Q. You did not notice either, when the bids were canvassed by the executive board, that you had made a mistake with regard to the masonry?

A. I did not notice anything further than that.

Q. $.50 on the earth excavation—is that right?

A. Yes, sir.

Redirect examination by Mr. MARSHALL:

Q. So far as the different engineers in the employ of Moffett, Hodgkins & Clarke were concerned, they had special duties to perform?

A. They had all special duties.

Q. They never had any experience of bidding on work of this character?

A. Some of them had, but not much.

87 Q. And they would not have been of any particular use to you in the matter?

A. No use to me at all.

8—

Q. And they were also engaged in other matters?
A. They were all engaged at that time.
Q. So far as the quicksand is concerned in route A, did that enter into your mind at all in fixing the price at $.70 a cubic yard?
A. No; I looked upon that as about the same thing as the hard-pan, not making any special difference. I never have had any serious trouble from quicksand—never apprehended any.
Q. So that the increase from $.50 to $.70 in your original calculation was not caused by the item of quicksand?
A. No, sir.
Q. And the quicksand was the same as hard-pan as far as the difficulties and the cost of handling is concerned?
A. Yes, sir; the quicksand was but a small proportion of the whole amount of the work.
Q. When you came to fill in Exhibit 1 A under subdivision B of route A you had originally written the $.50?
A. Yes.
Q. And you discovered the mistake and corrected that?
A. Yes.
Q. But when you came to subdivision D of route B?
A. Without making any correction. Route B—I had no time to go over it, or anything else, to see what I had.
Q. And you did your work mechanically?
A. Yes.

Counsel for the defendants objects to the last answer, and moves that it be stricken out as leading.
Answer stricken out by consent.

Q. Did you go over these figures at all with Mr. Moffett after you had written them in?
A. No, sir.
88 Q. Did you yourself go through them for the purpose of making any correction or alteration of any portions?
A. No, sir; I had no time.
Q. So far as this unbalanced bid was concerned, what do you say?
A. There was not the slightest intention. There was gross carelessness on my part, confusion or call it what you please. There was no intention of making any unbalanced bid. There was no reason for it.

Counsel for the defendants objects to the latter part of the answer.
Portion objected to stricken out by consent.

Q. It was not your purpose?
A. It was not my purpose at all.
Q. Did you get instructions from Moffett, Hodgkins & Clarke or any of the officers of that company to put in an unbalanced bid, or make you figure up on the theory of an unbalanced bid?

Counsel for the defendants objects to the question as incompetent and immaterial and calling for hearsay evidence.

A. I had no instructions from them whatever concerning the bid at all only to use my best judgment.

Q. You used the expression—you were guilty of gross carelessness—what do you mean by that?

Counsel for the defendants objects to the question upon the ground that the words show for themselves, also as incompetent and immaterial.

A. I say that I was careless in allowing the bid to go before the commissioners without my careful scrutiny and going over it again to check it up.

Q. And your reason for having done that was what?

Counsel for the defendants objects on the ground that it is incompetent and immaterial and a conclusion and improper evidence.

A. Because I had no time to.

89 Q. In making your calculations and in doing whatever work you did in this matter did you act in good faith?

A. I did throughout.

Q. And did you make every effort to be as careful as you could possibly be in your figures?

Counsel for the defendants objects to the question as leading, incompetent and immaterial.

A. I made every effort to.

(Signed) EDWIN H. BURLINGAME.

Mr. MARSHALL: I offer in evidence from the minutes of the executive board of the city of Rochester under date of December 23d, 1892, the following:

"*Proposals for New Conduit.*

Proposals for the new water conduit from Hemlock Lake well received and canvassed, and action on the award of contract deferred."

I also offer in evidence the following from the minutes of the proceedings of the same body of January 12th, 1893:

"Present: Messrs. Barnard, Schroth and Aldridge.
Mr. Aldridge in the chair.

Communications.

Communication received from Messrs. Moffett, Hodgkins & Clarke Co. was ordered filed.

By Mr. SCHROTH: Resolved, That the proposal of the Moffett, Hodgkins & Clarke Co. of New York, N. Y., submitted on December 23d, 1892, for the construction of a riveted steel pipe conduit, 38 inches in diameter, and all the required appurtenances thereto,

90 commencing at the north end of the contemplated masonry conduit, near the village of Hemlock Lake, Livingston Co., N. Y., and terminating at Mt. Hope reservoir, in the city of

Rochester, N. Y., and by route 'B' as described in the notice of letting for said work, be, and the same is hereby accepted, and that said work be and hereby is awarded to said Moffett, Hodgkins & Clarke Co.

Adopted.

By Mr. SCHROTH: Resolved, That the Moffett, Hodgkins & Clark Co., of New York, be and they are herewith required to attend at the office of this board, along with the sureties to be offered by said company, on or before Thursday, January 19, 1893, and to execute at that time the contract for the performance of the work of constructing a riveted steel pipe conduit, 38 inches in diameter, and all the required appurtenances thereto by route 'B' from the north end of the contemplated masonry conduit, near the village of Hemlock Lake, Livingston Co., N. Y., to Mt. Hope reservoir, in the city of Rochester, N. Y., and that the failure to such attendance and execution will be regarded as an abandonment of intention on the part of said Moffett, Hodgkins & Clarke Co. to perform said work.

Adopted.

By Mr. SCHROTH: Resolved, That the clerk be, and he hereby is, directed to cause immediate legal service of notice of award of contract to be made on the Moffett, Hodgkins & Clarke Co., of New York, N. Y., in accordance with the foregoing resolutions.

Adopted."

Mr. MARSHALL: I offer in evidence the notice that was served on defendants by the Moffett, Hodgkins & Clarke Co., referred
91 to in the minutes of the executive board last referred to which is marked "Exhibit 2," of March 10th, 1894.

I next offer in evidence the following from the proceedings of the executive board for the city of Rochester of January 20th, 1893:

"Present: Messrs. Barnard, Schroth and Aldridge. Mr. Aldridge in the chair.

Minutes of the last meeting approved as published.

Mr. Schroth reported to the board that an equity subpœna, bill of complaint and temporary injunction was served upon the board and the city of Rochester in an action in the United States circuit court, northern district of New York, between Moffett, Hodgkins & Clarke Co. *vs.* The City of Rochester and The Executive Board, praying that the proposals of said company submitted to the board on the 23d day of December, 1892, for contract No. 2 for constructing a steel-pipe conduit and appurtenances, for the additional water supply of said city be entirely rescinded, cancelled and declared null and void, or that said proposal be corrected and amended *to* certain particulars thereto named, and enjoining this board and its agents from declaring the complainants in default with respect *in* such proposal, and from declaring the bond executed on behalf of said company forfeited, and from in any manner suing upon or attempting to enforce or collect the said bond."

Counsel for defendants objects to the following resolution, which is read in evidence by Mr. Marshall as a continuation of the minutes

of the meeting of the executive board of January 20th, 1893, upon the ground that it is incompetent and immaterial.

92 Mr. Marshall (continuing reading):

"By Mr. SCHROTH:

By virtue of the power conferred upon the executive board by the charter of the city of Rochester, N. Y., be it—

Resolved, That the proposal of Whitmore, Rauber & Vicinus, of Rochester, N. Y., submitted December 23d, 1892, for the construction of a riveted steel pipe conduit, thirty-eight (38) inches in diameter, and all of the required appurtenances thereto, commencing at the north end of the contemplated masonry conduit, near the village of Hemlock Lake, Livingston county, N. Y., and terminating at Mt. Hope reservoir, in the city of Rochester, N. Y., and by 'route A,' as described in the notice of letting for said work, be, and the same hereby is, accepted, and said work be, and hereby is, awarded to said Whitmore, Rauber & Vicinus, who are herewith required to attend at the office of said executive board, along with the sureties to be offered by said firm, on or before Thursday, January 26th, 1893, and to execute, at that time, a contract for the performance of the work of constructing a riveted steel pipe conduit thirty-eight (38) inches in diameter, and all of the required appurtenances thereto, by 'route A' aforesaid, and that the failure of such attendance and execution of said contract is hereby declared an abandonment of intention and a default on the part of said Whitmore, Rauber & Vicinus to perform said work and execute said contract.

Adopted."

Counsel for defendants objects to the reading in evidence by Mr. Marshall of the following resolution, being included in the
93 minutes of the proceedings of January 20th, 1893, on the ground that it is incompetent and immaterial.

Mr. Marshall (continuing the reading):

"By Mr. SCHROTH:

Resolved, That the clerk of this board be, and he hereby is, directed to cause the immediate legal service of the notice of the award of said contract to be made on Whitmore, Rauber & Vicinus, of Rochester, N. Y., in accordance with the foregoing resolution.

Adopted."

Mr. MARSHALL: Without going through the minutes will you concede that a contract was subsequently entered into between Whitmore, Rauber & Vicinus and the city of Rochester?

Mr. KIEHEL: I object to it as incompetent and immaterial.

Mr. MARSHALL: The fact you admit?

Mr. KIEHEL: Yes.

Mr. MARSHALL: But its competency and materiality you object to?

Mr. KIEHEL: Yes.

Counsel for defendants admits the fact that a contract was entered into subsequently between Whitmore, Rauber & Vicinus and the

city of Rochester, but objects to the introduction of the evidence upon the grounds that it is incompetent and immaterial.

Adjourned to March 24th at 10 o'clock a. m.

94 Met pursuant to adjournment at New York, on March 24th, 1894.

Appearances.

Joseph Mullen, Esq., for plaintiff; Louis Marshall, Esq., of counsel; C. D. Kiehel, Esq., for defendants.

JOHN F. MOFFETT, a witness called in behalf of the complainant, having been duly sworn, testifies as follows:

Direct examination by Mr. MARSHALL:

Q. Mr. Moffett, where do you reside?
A. In the city of Watertown, New York.
Q. Were you an officer of the Moffett, Hodgkins & Clarke Company?
A. I was.
Q. In the year 1892, and since that time?
A. Yes, sir.
Q. What office did you hold?
A. The office of president.
Q. The Moffett, Hodgkins & Clarke Company is a corporation organized under the laws of the State of New Jersey?
A. Yes, sir.
Q. Who was the engineer who was connected with the Moffett, Hodgkins & Clarke Company who had the active supervision of the several engineering works done by your corporation?
A. At what time?
Q. During the year 1892—which one of your officers?
A. Mr. E. H. Burlingame was our chief engineer.
Q. Which member, which officer had the general charge?
A. Mr. Henry C. Hodgkins had general charge, oversight, of the engineering department of the business.
Q. Mr. Burlingame was what?
A. Was what we term chief engineer.
95 Q. He was a superintendent——?
A. He was an employee.
Q. Superintendent of Mr. Hodgkins?
A. Yes, superintendent of Mr. Hodgkins.
Q. When any important work was undertaken or any important building was done by your concern on public works prior to the time when Mr. Hodgkins became ill in 1892, who had charge of that?
A. Mr. Hodgkins did all the general oversight of it.
Q. When did Mr. Hodgkins become ill in 1892?
A. Some time just before Thanksgiving day—it must have been about November, or shortly after the middle of November.
Q. Was the nature of his illness such as to render him unable to attend to his business?

A. Yes, sir; he had typhoid fever.

Q. And in December, 1892, he was not at all engaged in any work for the company?

A. No, sir; he was sick at home.

Q. Did you learn, during the month of December, 1892, the fact that the city of Rochester was advertising for bids upon work connected with its water-works system?

A. I did.

Q. What, if anything, did you have to do with respect to the work of preparing bids for a contract?

A. You mean what I had personally to do?

Q. Yes; what was your first connection with it after you learned of the fact that the city was advertising?

A. I went to Rochester, and arrived there on the morning of the day that they opened the bids.

Q. Before that had you given any instructions to Mr. Burlingame to go to Rochester for the purpose of getting data for the preparation of the bid?

A. Yes, sir; some few days before that I had directed Mr.
96 Burlingame to visit Syracuse, Rochester and I think one or two other places, in order to get the necessary information to make a bid.

Q. Was Mr. Burlingame a man in whom you had confidence?

A. Yes, sir.

Q. How long had he been in your employ?

A. He had been in our employ several years.

Q. Had found him to be a reliable man?

A. Yes, sir; we had great faith in his honesty and reliability.

Q. The first time you were in Rochester in connection with this business was on the day when the bids were opened, the 23d of December, 1892?

A. Yes, sir.

Q. When you came to Rochester did you bring any paper with you relating to this bidding?

A. I brought the bonds given by the surety company for the security.

Q. The American Surety Company?

A. The American Surety Company.

Q. In what form were the bonds that you brought?

A. In the form of a book, bound book.

Q. It was in the pamphlets which were prepared by the city of Rochester for the bids upon this work?

A. Yes, sir.

Q. How many books were there that you brought in this way?

A. I think there were two, or four, it seems to me.

Q. Two you brought?

A. Yes; two or three.

Q. One relating to contract No. 1, relating to the masonry work, and the other contract No. 2?

A. Yes; relating to the pipe line.

Q. Were any blanks filled in those books except the blanks which were provided for the bonds which the bidder was to have filled?
A. Only the bond was filled out when I took them there. The figures upon the work were not filled out when I took them.
97 Q. What time of the day did you first see Mr. Burlingame after you got to Rochester?
A. The train was late and I did not arrive there till about 10, if I recollect; it might have been 10.30.
Q. Where did you come from?
A. New York city.
Q. Before that time, before you left New York, where were you engaged?
A. I think I had been in Boston for several days looking after some business there.
Q. After you saw Mr. Burlingame did you have any consultation with him in reference to the bidding?
A. I told Mr. Burlingame that——

Counsel for defendants objects.

Q. Did you have a conversation with him?
A. Yes.
Q. To what extent?
A. I had a conversation with him about the bids and putting in the proposals.
Q. Was there any understanding or agreement between you that the bids you were to put in were to be in the nature of unbalanced bids?

Counsel for defendants objects as incompetent, immaterial and irrelevant.

A. There was not.
Q. Did you have anything to do with filling in the blanks provided for the bidder?
A. No, sir; I did not.
Q. Did you have an opportunity to look over the bids or to look through the documents after the filling in was done?
A. No, sir; there was no time for me to look them over even; Mr. Burlingame had just time enough to fill them up, and barely that.
Q. Did you notice that Mr. Burlingame was actively engaged during that morning in the work of filling up the bids?
A. Yes, sir; he was very much hurried.
98 Q. Did you see from whas he took his data—from what papers or documents, if any, he took his data, with which he filled these blanks?
A. He had some papers before him. I am not sure, but he had a duplicate set of the specifications.
Q. Anything else?
A. He had a lot of other figures.
Q. On what?
A. On the printed paper before him.

Q. Memoranda?
A. Memoranda.
Q. After the quantities and prices were filled in what was done?
A. The bids were wrapped up in a—I think a piece of wrapping paper it was.
Q. What bids were put into that?
A. Two bids.
Q. On contract No. 1 and contract No. 2?
A. Contract No. 1 and contract No. 2.
Q. And how many of the pamphlets were together that way in the packet?
A. Two of them.
Q. Two referring to each contract?
A. Yes, sir.
Q. So that there were four pamphlets in all put into this package?
A. Yes, sir.
Q. How were they fastened together—these pamphlets?
A. They were fastened together with two large rubber bands, or rolled up together and fastened with two large rubber bands—all rolled up together.
Q. What was there around the package, if anything; was there any wrapper or anything of that sort—an envelope?
A. Outside of that was a large wrapper—we took a piece of legal cap paper, I think, and rolled it up so that we could write upon it what the bid consisted of; we endorsed it as directed in the specifications.
Q. That is, you had but one endorsement on the entire package?
A. Yes, sir.
Q. What did you do with it then?
A. We went over to the office of the board of public works, I think they call it——
99 Q. The executive board?
A. Yes; the executive board.
Q. To whom did you hand it?
A. We handed it to the clerk of the executive board.
Q. Who was present at the time?
A. Yes, sir.
Q. I ask you who was present?
A. At the time we handed it to him the board was not in session. Mr. Aldridge—that is his name——?
Q. Yes.
A. And other members of the board were in a little ante-room, and he came out and we handed it to him. The clerk came out and took the bid, and very soon after they filed into the room and got round the table.
Q. What took place then?
A. They began opening and reading the bids. When they came to our bid they passed it one side and said it was irregular and informal.
Q. Did they say why?

A. We had not filled in the amounts—the prices—we had not filled up the amounts. Mr. Burlingame had taken a duplicate schedule and made up his prices. We did not have time to copy that into the bid—to copy those prices; so he took the duplicate schedule and put it right into the bid and referred to it in the bid that those were the prices.

Q. Did they not make an objection also to the fact that the bond was not in the same pamphlet with the bids?

A. Yes, that was one of the reasons, that the bond did not cover the bid.

Q. Well, what was next done, or said?

A. There were questions raised as to whether they should read our bids at all, but finally after a consultation they read our bid, but——

Q. What else took place?

A. I can't remember the exact words used, but it was read under protest—that is to say they would not accept——

Counsel for defendants moves that the latter part of the answer be stricken out.

It is stricken out by consent.

100 Q. What was said in substance on that subject?

A. After consulting together they said—I think Mr. Aldridge said—they would read the bid, but that they could not receive it, they could not entertain it, because it was irregular and informal.

Q. Well, then, what took place?

A. That they would read it for information—that was my recollection of what he said.

Q. What was the next thing that took place?

A. Just about that time I left the room; I did not remain; Mr. Burlingame remained, but I had to take the train; I had just time to get the train if I left about that time. That is about as far as I remember.

Q. What experience have you had in the work of laying pipe?

A. I have had an extensive experience for eleven or twelve years.

Q. In what capacity?

A. In building water works in various cities and towns away up the country.

Q. Are you familiar with the fair value of the work of earth excavations in trenches for a 38-inch pipe—iron pipe?

A. Yes, sir; I think I would be competent to judge of it.

Q. Do you know what the fair market value is of such work?

A. Yes, sir.

Q. What was the fair market value of such work in 1892?

A. For what?

Q. Earth excavation in trench?

A. Just simply the earth excavation?

Q. Earth excavation in trench.

A. No back-filling or anything?

Q. Just as we have it in these specifications. I will read the

specification. "Earth excavations in open trenches or pits for masonry and pipe conduit, entrance and overflow chambers, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings and culverts carried under said conduit, including bracing and sheeting, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less bailing and draining and other incidental work." What do you say as to that?

101

A. What size pipe is that?

Q. 38-inch pipe in this case.

A. Is it per cubic yard?

Q. Per cubic yard.

A. Let me look at the specification. Do you want what we bid there or my judgment of what the work is worth?

Q. We know what you bid. I don't ask you what you bid. What I want to know is what it is worth, not what you bid for it.

A. Well, I suppose $.80 per cubic yard would not be out of the way.

Q. Could it be done for $.50 per cubic yard?

A. No, sir; not without loss.

Q. Did you authorize Mr. Burlingame to bid $.50 per cubic yard?

COUNSEL FOR DEFENDANTS: I object to that. He does not say that he said anything.

A. No, sir; I did not.

Q. If you had known that he had inserted in this blank $.50 per cubic yard would you have permitted the bid to have gone in at that price?

Counsel for defendants objects as leading.

A. No, sir; I would not.

Q. Did you return to Rochester on the 11th of January, 1893, and submit a communication to the executive board of the city of Rochester?

A. I did.

Mr. MARSHALL: I offer in evidence the communication attached to the complaint, marked Schedule E.

Q. That is the communication you submitted (handing witness paper). I have not got the original. I show you the communication, and ask you if that is the one you submitted.

102

A. That is a copy of the communication submitted by me.

The original of this document is to be deemed marked "Ex. 1, March 24th, 1894."

Q. After that time did the board notify you that they desired you to enter into a contract?

A. They did.

Q. For route B of contract No. 2?

A. Yes, sir; they served notice on us.

Q. On the day designated for entering into the contract an injunction had been served on the defendant in this case—the preliminary injunction obtained from Judge Coxe?
A. Yes, sir.

Mr. MARSHALL: I offer in evidence the temporary injunction which was so served.
Marked "Ex. 2, March 24th, 1894."

Cross-examination by Mr. KIEHEL:

Q. When Mr. Hodgkins became ill Mr. Burlingame was employed by your company to take Mr. Hodgkins' place, was he not?
A. No; Mr. Burlingame had been in our employ for a number of years.
Q. But when Mr. Hodgkins became ill he was then given charge of the matters which Mr. Hodgkins had supervision of?
A. Yes, sir; quite largely.
Q. Well, there was no reference made, or no consultations in regard to that particular department by Mr. Burlingame with any member or with any office of the company after Mr. Hodgkins was taken ill?
A. Yes, sir; Mr. Burlingame consulted with me after that whenever he was able to reach me—when I was in the office.
Q. You mean as to the engineering?
A. As to the engineering, or letting of contracts, or anything of that kind.
103 Q. Did he consult you with regard to the engineering part?
A. Frequently.
Q. Are you a civil engineer?
A. I am not by profession—no, sir.
Q. I presume that the consultations that he had with you had reference more to the business part of it than to the professional part?
A. Yes, sir; perhaps largely; and yet in the course of 10 or 11 years' experience in that particular form of engineering—water works—I had become as familiar with it as most engineers, although I don't pretend to be a civil engineer by profession.
Q. Then Mr. Burlingame would consult with you when he had the opportunity, but it was not one of the requisites in all matters he had in charge to do so?
A. No.
Q. You say you were in Boston before you started for Rochester, I believe?
A. Yes, sir.
Q. Can you tell me what day you went to Boston?
A. No; I can't exactly, but it was two or three days before—two days, I think. I was in Boston two days.
Q. Can you give me the dates of the month?
A. It was in December.

Q. Can you give me the days of December, or the days of the week?

A. I can't without referring to my diary. I keep a diary.

Q. Have you the diary here?

A. No.

Q. Well, I am quite anxious to know definitely; could you tell definitely from that diary?

A. Yes, I think I could.

Q. Will you produce it at this hearing or at the next hearing?

A. The diary for that year is in Watertown.

Q. I would like to know definitely just your movements during that week?

A. Well, I will give it to you if I can get it; of course I can't remember definitely.

104 Q. Where were you before you went to Boston?

A. Well, I could not tell; my impression is that I went from here over to Boston.

Q. You mean from New York to Boston?

A. Yes, but I would not be positive about that. I might have gone from Watertown to Boston.

Q. Did you have an office in Watertown?

A. No, sir; I resided there.

Q. What business was in Boston to which you attended?

A. I had the general oversight of the construction of the Butte City water works, and the general office of that company was in Boston; then, too, I had the oversight of the building of the Callesville, Montana, water-works system, and that office was in Boston; and I was also interested in other mining matters, copper mining in Boston—Montana, Butte and Boston Mining Company.

Q. These companies to which you refer are in the West?

A. They have their offices in Boston.

Q. But the mines are in the West?

A. Yes, sir.

Q. To how many of those offices did you go during the time that you were in Boston?

A. These offices that I speak of are all on one floor—third floor of the building.

Q. And all under one supervision?

A. Yes, sir.

Q. So that virtually they had one office, though different organizations, in the one office?

A. Yes, sir.

Q. And you went there for what purpose—in a general way?

A. To consult with them about the works, the building of the works, and the financial affairs, and also the physical condition of the works, engineering and so on.

Q. That was a matter that you had to do quite frequently—to go to Boston and consult with them there?

A. Yes.

105 Q. As matters turned up from time to time?

A. Yes, sir.

Q. Were you in communication with the mines in the West?

A. Yes, sir; with the water company more particularly.

Q. The communications which you received at times from the companies in the West were such at times as brought you to the office in Boston?

A. Yes.

Q. They were under construction at the time?

A. Yes, sir.

Q. There was nothing at the time that was of a serious nature, or anything more than the usual course of business of constructing, when you did go to Boston at this time, was there?

A. I could not tell without referring to memorandum, but my impression is that I was called there to attend a meeting of the board of directors of the Butte City Water Company.

Q. That is your recollection, then, that that is the meeting to which you were called?

A. Yes.

Q. Do you remember what day of the week that meeting was held?

A. I do not.

Q. Which of the days that you were in Boston was that meeting held?

A. I could not tell you.

Q. Was it the first day?

A. I presume it was; I could not tell you positively.

Q. Well, that is your best recollection now?

A. Yes; I think it was the first day.

Q. And then the balance of the time you were there you were occupied with matters that occurred to you in a general way—that you had consultations with the different officers of the different companies?

A. Yes, sir.

Q. So far as you now recollect there was nothing else that called you to Boston in any way but this board of directors at this time?

A. Well, I could not say about that.

106 Q. Well, so far as you recollect there was not anything specifically that called you to Boston at this time but this meeting of the board of directors?

A. I did other business while I was there.

Q. Yes; I appreciate that, but I am speaking——?

A. I think I was called to Boston to attend this meeting of directors, and while I was there I had my hands full of business.

Q. You did other business certainly, but what I want to learn is whether there was anything else besides this board of directors' meeting that called you to Boston specially at that time?

A. I can't remember that there was.

Q. Who gave the information to Mr. Burlingame, if you know, in regard to the contract for the Rochester water works; who told him to go?

A. Who told him to go?

Q. Who told him of it?

A. I can't tell you.

Q. Do you remember whether you were the one that informed him of the fact that bids were advertised for by the Rochester water works, or executive board?

A. I can't tell you; I don't think I did; I think the papers would go right into the engineering department. He would be more apt to bring them to me than I would be to him.

Q. Do you mean, then, that he brought them to you and consulted with you as to the advisability of making bids for that work?

A. He did, that I remember.

Q. Do you remember when that was?

A. Well, it was a few days prior to the making of the bids.

Q. What was your best recollection of the number of days?

A. I should think about four or five. I am not positive about that; I am only giving you my best recollection about that.

Q. Might it not have been as much as ten days beforehand so far as your recollection is concerned?

107 A. My impressions are, my recollection is that it was not as much as that.

Q. If Mr. Burlingame has testified to the fact that this matter was brought to the notice of your company at least ten days before the time of bidding, what would you say as to your impression or as to your best recollection?

Mr. MARSHALL: I object as incompetent and improper.

Q. You did not get my question exactly; I don't think you understood?

A. You asked me to know about how many days when Mr. Burlingame brought it to my attention. You are stating in regard to his answer how many days the concern had the notice.

Q. Yes, if you know, I say?

A. Well, I don't know how many days the concern had the notice, but I was talking about the time Mr. Burlingame brought it to my attention.

Q. Then your recollection is that Mr. Burlingame brought it to your attention some four or five days before the letting of the contract?

A. Well, from four to six days, I should say; that would be my recollection, but I am not positive.

Q. When you came back from Boston, or when you left Boston at this time in question, where did you go?

A. I came to New York.

Q. Came to New York to the office of Moffett, Hodgkins & Clarke Company?

A. Yes, sir.

Q. And do you remember how long you stayed in New York before you started for Rochester?

A. Well, it was a very short space of time.

Q. Well, give me your best recollection. I want to get it as near as you can?

A. I can't remember just how long.

Q. Was it a day or two days?

A. No; part of a day. My son brought those bonds to me.

108 I can't remember whether he handed them to me in the office of the company or wheth-r he brought them up to the hotel.

Q. What hotel?

A. The Hotel Gerlach. My recollection is that I arrived home from Boston on the morning preceding the day of the bidding. I might not have arrived until the afternoon; I can't tell positively, but the bonds from the surety company were put into my hands but a very short time before the leaving of the train—my taking the train to go to Rochester. I remember there was great haste and great worry about it for fear we would not get it in time to take the train.

Q. You had nothing to do with the securing of those bonds, had you?

A. No, sir.

Q. And did you wait for those bonds before you took the train to go to Rochester?

A. Yes, sir; I waited a short time.

Q. When you came back from Boston you could have gone to Rochester earlier than you did had those bonds been placed in your hands?

A. I am not quite sure of that; I am not sure. I can't remember whether I came over from Boston in the night, or whether I waited until morning, to come over in the morning. I could not tell; I am trying to think, but I can't tell; I can't remember.

Q. You, of course, knew of this contract, or of this bid—the advertising for bidding before you went to Boston?

A. Yes, sir.

Q. Do you remember what train you took from New York to Rochester?

A. I took the 9.15. Well, I won't be sure whether I took that or the fast mail.

Q. There is a 9 o'clock train from New York at that time?

A. Yes; they call it the fast mail.

Q. Which arrived in Rochester at 7 o'clock?

A. At 7 o'clock, I won't be sure which I did take.

Q. There is another train that left New York at that time,

109 about 8 o'clock, which arrives in Rochester about 6 o'clock in the morning; do you know anything about that train?

A. Never heard of such a train. I think the 9 o'clock is the train I was on.

Q. That is your best recollection now, that you were on the fast mail that left New York at 9 o'clock?

A. I am not sure I was on the fast mail; my best recollection is I was on the fast mail that leaves New York at 9 o'clock.

Q. And arrives in Rochester at 7 or 7.30?

Mr. MARSHALL: He doesn't say he arrived at that time on that train.

The WITNESS: The train was late.

Q. Do you know how late the train was?

A. It was half past ten when the train got into Rochester, and it was a quarter to eleven when I got to the hotel. I think these bids were opened at 12 o'clock—about 12. It was very short time; the train was away behind.

Q. You are quite sure that it was the fast mail?

A. I am not going to be quite sure because I am not sure. That was my impression it was one of those trains, but I would not be sure which one.

Q. What is your best recollection as to the number of hours that train you went on was late?

A. I have told you I arrived there at the station just about half past ten, and it was a quarter to eleven when I got up to the hotel.

Q. What I want to get at is if you have any recollection at the present time as to the number of hours that train you were on was late at Rochester?

A. I could not tell; I have forgotten which train it was.

Q. I don't ask you which train it was. I ask what your recollection is as to the number of hours that particular train you were on was late?

A. Three and a half hours if it was the fast mail, and three-quarters of an hour if it was the other.

110 Q. What I want to get at is now what your recollection is of the number of hours that the train was late as it is impressed upon your mind at the present time, irrespective of figuring out?

A. My present impression, my best recollection is now that it was the fast mail, and that we ought to have been there at 7 o'clock and we did not arrive there until 10.30. That is my best recollection, but I am not sure of it. I might have been on the other train.

Q. That is your best recollection now?

A. That is my best recollection.

Q. I presume you immediately went to the hotel from the train—to Powers' hotel?

A. Yes.

Q. And met Mr. Burlingame there?

A. Yes; went right to his room.

Q. And Mr. Burlingame was engaged at that time in filling in the prices, the several items in the pamphlet contract?

A. Yes, sir.

Q. The contract in pamphlet form?

A. Yes, sir.

Q. Was he through with that work when you arrived there?

A. He was not; he was working at it as fast as he could.

Q. And I presume you did not interrupt him in regard to it?

A. No, but very little. He said, "I will hurry." I said, "I don't believe you, you will get those bids in."

Counsel for the defendants moves that the conversation be stricken out as not responsive, incompetent and immaterial.

Mr. MARSHALL: I will leave it in.

Q. Did you see any of the prices that had been and were inserted in the pamphlet contract after you came there, by Mr. Burlingame?

A. No, sir; I can't say that I did. I might have looked over his shoulder and tried to get a little out of it, but I did not.

111 Q. So your best recollection at the present time is that you allowed him to finish the work without looking to see what had been inserted by him?

A. Yes, sir; I could not look it over—I did not have time—that is the schedules.

Q. I referred to the prices inserted in the pamphlet contract furnished to you by the executive board?

A. Yes, sir.

Q. What did you do while Mr. Burlingame was engaged in inserting these prices after you had arrived there?

A. I was engaged in filling up the bids—the remainder of them that had not been filled up. I brought up the bonds.

Q. What do you mean by the remainder of the bids?

A. There was some blanks to be filled out, and in addressing the communication I was putting into the bid somewhere in the blank space that our bid—I don't know what I said, but the effect of it was that we did not have time to copy the figures in, but they should consider the figures in the schedule annexed to be taken the same as though they had been written in the bid.

Q. What you have been trying to recollect is as follows: "See annexed schedule of prices in duplicate form of contract which are made part of this bid as though incorporated herein."

A. Yes.

Q. Is that in your handwriting?

A. That is in my handwriting, I think; yes, sir.

Q. What else was there that you inserted in any blank in the contract?

A. If you let me take that I will look through and see.

Book handed to witness.

Q. That is the one in which the bond was executed?

A. I don't know how much there was in the other; I filled that in here (indicating).

Q. You mean that on the same page in which I read was inserted by you, you filled in the letters and changed "he" into "they"

112 and filled out the words "are" and "have." Is that correct?

A. Yes.

Q. Tell me what else.

A. There was some other work that I did, I think, but I don't know that it was in this or not; I can't tell.

Q. Just look through that and see whether you will find anything more.

A. I filled in the time he was to complete the work somewhere, though I won't be sure. Mr. Burlingame might have done that.

Q. On page 38 of Exhibit 1 B you have inserted "400 days"—wrote it out at length and in figures.

A. Yes, sir; that is all.

Q. That is all in that exhibit?

A. Yes.

Q. I show you now "Exhibit 1 A," and ask you to tell me how much you inserted in that pamphlet (handing witness pamphlet).

A. I did not have anything to do with that book at all.

Q. You did not insert anything in "Exhibit 1 A"?

A. No, sir.

Q. I show you now the bid of your company for contract No. 1, and ask you how much you filled in in that contract (handing witness paper.)

The witness indicates in the contract the blanks filled in by him.

Q. You inserted on page 15 of the blank pamphlet of contract No. 1, in which you and the surety company executed the bond, "400 days" in longhand written out and "4002" in figures. Is that correct?

A. That is right.

Q. And on page 7 of the same book tell us what you have inserted?

A. I changed the word "he" to "they," and inserted the words "are" and "have."

Q. "'ve" in the word "have"?

A. Yes, and changed the word "he" to "they" in five different places. Then I wrote in "See annexed schedule of prices in
113 duplicate form of contract, which are made part of this contract as though incorporated herein." That is all.

Q. And in the blank form of contract No. 1, in which Mr. Burlingame inserted the prices for the different items in the proposed bid, you inserted nothing. Is that correct?

A. Nothing.

Q. And these four pamphlet books which have just been shown you are the only ones filled out and submitted by your company to the executive board?

A. Yes, sir; I think those are the ones.

Q. Who signed the name of the company, "Moffett, Hodgkins & Clarke" (showing witness book)?

A. I can't tell you.

Q. The words "Moffett, Hodgkins & Clarke Company, by president" are not in your handwriting?

A. No, sir.

Q. The only thing which is in your handwriting is the name of "J. F. Moffett"?

A. Yes, sir.

Q. Do you remember when you signed that?

A. No, sir; I do not.

Q. Do you remember where you signed that?

A. No, sir; I do not.

Q. Could you tell whether you signed that downtown in the city of New York or uptown at the hotel where you were stopping?

A. My impressions are that I signed it downtown. I think I signed it in the office of the surety company.

Q. Do you remember what time of day?

A. I do not.

Q. But your best recollection is that it was signed downtown in the city of New York, and not at your hotel or place of residence in the city?

A. I could not be sure of it.

Q. You think it was not signed at the residence or the hotel?

A. I think it was not.

Q. Had you done any business with the surety company before this of the same character?

A. I don't remember I have.

114 Q. Was it the fact that the blank forms of contract in which the bonds are executed were to be left in New York for the purpose of having the bonds executed while the blank forms in which the prices were inserted by Mr. Burlingame were taken by him to Rochester for the purpose of inserting these prices?

A. Did I know of such an arrangement, do you mean?

Q. Yes.

A. No; I did not.

Q. You knew nothing of that, I presume?

A. No.

Q. Who wrapped up the bids, or that pamphlet form of the contract after the prices had been inserted in the manner that you have described in your direct examination?

A. I can't tell positively whether I did it or Mr. Burlingame.

Q. Were the four pamphlet books wrapped up in one package?

A. Yes.

Q. To your best recollection?

A. Yes, sir.

Q. Who took them over from the hotel to the office of the executive board?

A. My recollection is that I took them. Still I would not be positive.

Q. Who handed them to the clerk?

A. Mr. Burlingame handed them to the clerk; he knew him and I did not know him; he handed them; I would not be sure.

Q. What did the clerk do with the bids when they were handed to him by Mr. Burlingame?

A. He took them into the side room there of the office. He took them into his office.

Q. And the executive board had its meeting in the outside office when they called the meeting to order at 12 o'clock?

A. Yes, they had a large table there. They were first in the inside room.

Q. And the clerk brought out your bids with the rest of them?

A. Yes, sir.

Q. And did not the clerk read the prices or the bids that
115 were inserted by Mr. Burlingame?

A. He did after a time—after objections were made.

Q. You talk about objections. You say "They said." Will you tell me who it was that said anything?

A. Mr. Aldridge did most of it. The clerk did the reading, but Mr. Aldridge did the——

Q. Talking?

A. Talking.

Q. Did anybody else besides Mr. Aldridge do any talking at that meeting of the board?

A. Yes, sir.

Q. In regard to your bid I mean?

A. Yes, sir; some other member of the board. They were passed over to him, and he looked at them; it might have been an attorney—I don't know who it was; he sat there at the table, and he said "Those bids ar not right," and put them one side. Then they opened them up again.

Q. Now, what were the words that Mr. Aldridge spoke when your bids were looked over by him, or after he had looked over your bids?

A. Well, I could not give the exact words; I don't think it is possible to reproduce the exact words, but I know what the effect of it was.

Q. After what had been said by Mr. Aldridge and this other person who looked over the bids, the clerk read over your bids the same as he read over the other bids, is not that so?

A. I don't know how far he went; my recollection is that I left before he had finished. I know I did.

Q. But he began reading the same as he read the other bids before you left the room?

A. Yes.

Q. And while he was in the act of reading them you left?

A. I left the room. I think that was it.

Q. Can you tell me what else you did during the time that you were with Mr. Burlingame at the hotel besides inserting the matter which you have testified to in the four pamphlet contracts
116 shown you?

A. I was reading over such parts of the bid as I had—looking it over while he was copying.

Q. Looking over the items?

A. Yes, sir.

Q. And the prices that were inserted?

A. I did not have the prices to see when I was looking over the general form.

Q. Do you know whether he had inserted the prices in one book, or whether he had completed the inserting of the prices in this book when you arrived at the hotel, or at his room?

A. No, sir; he had not quite completed even that one book. When he had finished that he then commenced copying into the other.

Q. Do you remember which one he finished first?

A. What do you mean?

Q. Which form or which blank he finished first, whether it was the blank in contract No. 1 or contract No. 2?

A. No, I could not tell.

Q. What did you do after he had finished that one contract and while he was inserting the prices in the other contract?

A. Well, I can't remember.

Q. Did you read over the prices that he had inserted in the contract which he first finished?

A. No; I did not; I did not have any opportunity of looking them over.

Q. Tell us, then, with what you consumed the hour while he was inserting—while Mr. Burlingame was inserting—the prices in the second contract or in the contract which he last filled out?

A. As I said, I was examining the bids and looking them over—the remainder of the bids and bond—and reading the bids through to see how it came out, and studying how we would get the thing together without having to fill up. We did not have time to fill and put that schedule in.

Q. You inserted this clause which you have read as to annexing the one blank pamphlet with the other for the purpose of
117 avoiding the inserting of the prices in the pamphlet form in which the bond was executed?

A. Yes.

Q. And after that was done there was, in your estimation, no necessity of inserting the prices in the pamphlet form in which the bond was executed.

Mr. MARSHALL: I object as a conclusion and improper.

A. That is not the fact.

Q. That was your opinion, wasn't it?

A. No.

Q. What is your opinion?

A. My opinion was that it was the very best we could do; we did not have much time to do it. There was great necessity for it, but we did not have time.

Q. And you did this as a substitute?

A. Yes; the best we could do.

Q. After you done that, could you tell me particularly in any way what else you looked over?

A. I think I have told you as far as I am able to how I was occupied—as far as I can remember.

Q. I don't understand you.

A. I was occupied in examining the bid, seeing the bond which I had not had time before to look over, and looking over the other papers that Mr. Burlingame was using.

Q. Do I understand you to mean that you simply examined the bond and the execution of that without examining the items and prices?

A. Did not have the items and prices.

Q. There was one pamphlet form in which the prices had been written out by Mr. Burlingame while he was engaged in filling out the prices in the second contract. I want to know whether you examined this with the bond.

A. My recollection is that the bond which I examined—the form

which I examined did not have any prices. I think Mr. Burlingame had that copy, and I could not get at it. That is my recollection.

118 Q. Well, the prices in both contracts are inserted by Mr. Burlingame, are they not?

A. Yes, sir.

Q. And it is correct that during the latter part of the hour that you were with him in his room at Palmer's hotel he was engaged in inserting the prices in one of the contracts?

A. Yes, sir.

Q. Now, while he was doing that the bids, or the prices which had been inserted by him in the other contract, were there?

A. Well, I suppose they were.

Q. Did you not, while Mr. Burlingame was engaged in that manner, look over the prices which he had already inserted?

A. I have no recollection of it.

Q. You had time to do it; did not you have?

A. My recollection is that I did not have any opportunity of doing it.

Q. Were not the only papers that were there in reference to the contracts with the city of Rochester the two pamphlet contracts in which your company and the surety company had executed the bonds, and which had been carried by you from New York to Rochester, and the pamphlet book duplicates of what you had brought from New York to Rochester, in which Mr. Burlingame had inserted the prices in the proposal bid?

A. That was not all the papers that were there, by any means.

Q. Were not those the only papers that were to be submitted to the executive board?

A. That is all to be submitted to the executive board.

Q. And all that required your examination while Mr. Burlingame was filling out the prices in the last contract were the two blank pamphlet forms in which the bonds were executed and the one pamphlet form in which the prices were inserted?

A. No; Mr. Burlingame had——

Q. Is not that correct?

119 A. No; it is not right. Mr. Burlingame had a lot of letters there from persons with whom he had correspondence about the work, and I was looking over his correspondence to see what he had got from them; and he also had estimates of the cost of certain buildings of the works, and I was looking at those, and he had a lot of figures there that I tried to look over, but the time was so short it was gone by before we had time to look; and he kept asking me questions and proceeding with his work, and the hour went by very quick.

Q. And your recollection is that you did not examine the prices which he had inserted in the first blank form of contract which he had completed before you came there?

A. That is my recollection.

Redirect examination by Mr. MARSHALL:

Q. The last thing Mr. Burlingame did before going over to the executive board was to fill out which of these contracts—these bids?

A. Which contract do you refer to?

Q. No. 2 or No. 1—which was the last that he filled in—No. 2 is the one which related to the pipe line.

A. No. 2 was the last one. That related to the pipe line. I think that was so.

(Signed) J. F. MOFFETT.

JOHN E. PORTER, being first duly sworn, testified as follows:

By Mr. MARSHALL:

Q. What is your name, age and place of residence?

A. John E. Porter, age 29, residence Pittsburg, Pa.

Q. What is your occupation, Mr. Porter?

120 —. I am secretary and treasurer of the Carroll-Porter Boiler and Tank Company.

Q. That is a corporation that does business at Pittsburg?

A. Yes, sir.

Q. And what is the nature of the business?

A. We do all kinds of boiler-work, heavy plate-iron work and riveted-pipe work *work*.

Q. Are you acquainted with Edward H. Burlingham, formerly in the employ of the Moffett, Hodgkins & Clarke Company?

A. Yes.

Q. Were you in any way connected with that corporation?

A. No, sir.

Q. Neither as officer, stockholder or otherwise?

A. No.

Q. Was your corporation a competitor to that corporation?

A. Yes, sir.

Q. Do you remember the occasion when the city of Rochester and its executive board advertised for bids for work to be done in the construction of the new conduit line?

A. Yes, sir; I do.

Q. Your corporation was one of the bidders on this work?

A. Yes.

Q. And were you familiar with the ground which was to be used for this conduit line?

A. Yes, I walked over the upper portion of it.

Q. What do you mean by the upper portion of it?

A. We walked over about 14 miles of it, from the lake down towards the city.

Q. From Hemlock lake towards the city?

A. Yes.

Q. Were you present at the time when bids were presented for that work?

A. Yes, I was present.

Q. Will you state when that was?

A. I cannot remember the day—it was about three years ago—two or three years ago.

Q. Where were the bids presented?

A. At the chamber of the executive board.

121 Q. In the city hall?

A. At the city hall.

Q. In the city of Rochester?

A. In the city of Rochester.

Q. Who was present at the executive board the time the bids were presented?

A. I handed my bid to Mr. Nevil.

Q. Who of the board was present when the bids were opened?

A. I was present when the bids were opened and the whole board was present, Messrs. Aldridge and Barnard, and I think a Mr. Schroth.

Q. What did you observe as to the presentation of bids by the Moffett, Hodgkins & Clarke Company on that occasion?

A. I do not remember seeing the bid presented.

Q. After it had been presented, do you recall what occurred with respect to it?

A. When the bids were opened?

Q. Yes, when the bids were opened.

A. I was taking down the bids and had a bidding sheet and I remember that there was some discussion about their bid in connection with the bond and the bid being separate, or something of the kind.

Q. Did you see the bids at the time—the form in which they were presented?

A. Yes.

Q. What was there about them?

A. The bid was on one blank and the bond on another.

Q. And what objection was made upon that—state what was said.

A. Mr. Aldridge said that the bid was not in form, but that they would receive it—or something to that effect.

Q. What was the next thing you observed with respect to the bid of Moffett, Hodgkins & Clarke Company—what occurred with reference to it?

A. Well, when they got down to the item of excavating on the contract——

Q. Which contract?

A. Route "B," contract No. 2—Mr. Nevill thought the
122 price of Moffett, Hodgkins & Clarke Company at 50 cents per cubic yard for the earth excavation was too low, but Mr. Burlingham interrupted him and said that was a mistake and that it should be 70 cents, the same as the estimate on route "A," and there was some discussion about it at the time, but Mr. Aldridge said he might as well go on and read it as the bid was informal.

Q. And they proceeded to read it?

A. Yes. I was taking the figures down at the time, but I remember the interruption.

Q. Now, what is your best recollection as to the order in which the Moffett, Hodgkins & Clarke bids were read with respect to other bids for that work?

A. It is very long ago and I cannot say positively, but my memory is that their bids were read first.

Q. Before any others?

A. Yes.

Q. That is your best recollection?

A. Yes.

Q. Have you been engaged in making bids on similar work for any length of time?

A. We have been bidding a great deal on piping work.

Q. And laying of pipe?

A. Yes. We are at present laying a good deal of piping.

Q. Had you before that time been engaged in the business of laying that sort of pipe?

A. Yes, sir.

Q. And were you familiar with the form marked C for excavating, as described in the specifications under this contract?

A. Yes.

Q. Was form marked C, for work of excavating as described, in your specifications?

A. Yes.

Q. What do you say as to what was a fair market value for this earth excavation referred to?

A. What our bid on the work was?

Q. What is your estimate for this work?

A. I estimate it at 75 to 80 cents.

Q. Per cubic yard?

A. Per cubic yard.

123 Q. What do you say as to whether or not 50 cents per cubic yard was a fair value for such work?

A. I would consider it below cost.

Q. How much below cost, in your judgment?

A. Well, at least 10 per cent.

Q. You mean 10 cents per cubic yard?

A. Yes, it would be about 10 cents—20 per cent.

Q. According to the best of your judgment, this work could not be done for 50 cents per cubic yard?

A. I would say it can be done for that, but it would be below cost.

Q. Do you know how long a period was taken up in the reading of the Moffett, Hodgkins & Clarke bid?

A. No, I cannot say positively—I think about two hours altogether.

Q. How long was this delay that you speak of, which was in the discussion of the question as to the formality of the bid?

A. Only two or three minutes.

By Mr. RODENBECK:

Q. I do not suppose, Mr. Porter, you have a very definite recollection as to what occurred at the time the bids were opened before the executive board?

A. Not as to dates and things of that kind, but I remember the circumstances in connection with Mr. Burlingham's bid because I took the whole of the bid down on the bidding sheet.

Q. Can you tell at this time how many bids were presented for contract No. 2?

A. Four.

Q. And how many were presented for contract No. 1?

A. Five.

Q. Did you see either or both of these contracts?

A. Both.

Q. How long had you been in the city of Rochester prior to the date upon which the bids were opened?

A. About a week, I think.

124 Q. During that time had you been about the city with Mr. Burlingham?

A. I met him in the hotel.

Q. You met him at the Powers hotel?

A. Yes.

Q. You met him in his room?

A. No, sir.

Q. During that week did you go about with him at all?

A. No, I was not about with him at all.

Q. How long had you known him?

A. I don't remember how long I had known him at that time.

Q. Tell us as near as you can.

A. I think five or six months, possibly.

Q. Do you know any members of the firm of Moffett, Hodgkins & Clarke Company—a corporation I mean?

A. I knew Mr. Todd Moffett; I do not know whether he is a member of the firm or not.

Q. Did the company with which you were connected bid on the work jointly with the Moffett, Hodgkins & Clarke Company?

A. No.

Q. Had your company been doing work for them or furnishing them with material?

A. We did one contract for Moffett, Hodgkins & Clarke Company, but I do not remember whether it was before or since that time.

Q. Your company furnished some material for the new conduit for the city of Rochester?

A. Yes.

Q. Can you state in how many contracts the work for the new conduit for the city of Rochester was divided?

A. All I recollect is that Jones & Son got the tunnel and open cut.

Q. Well, all I care to know is how many subcontractors.

A. Two, I think, besides ourselves.

Q. I do not believe you understand me. I want to know into how many contracts the original was divided—how many different kinds of bids.

A. I can only remember two—I think there were four.

Q. How many did your company bid on?

A. Two, I think, was all we bid on.

125 Q. Do you recollect when it was your company received the printed specifications and contracts for the work?

A. I do not remember that—it was some little time before the bids were opened.

Q. Who made up the bid for your company?

A. In what way?

Q. Who did the figuring and who prepared the bid?

A. I prepared the bids, and with the assistance of a man that went over the land with me.

Q. And that man, was he in the employ of your company?

A. No, we were paying his expenses—he was not in our employ.

Q. Was he in the employ of the city?

A. No, sir.

Q. Who was he?

A. Mr. E. C. Mayham.

Q. What firm or corporation was he connected with?

A. He was with T. A. & R. G. Gillespie, I think.

Q. What kind of business were they engaged in?

A. They are the parties who built the East Jersey pipe line.

Q. And this gentleman, was he an engineer?

A. No, he was a practical man.

Q. But not an engineer?

A. No, not an engineer.

Q. What is your profession?

A. Mine?—well, I was educated to be an engineer, but did not quite finish.

Q. Well, are you practicing that profession?

A. No.

Q. Is that the line of work you do in connection with your company's business?

A. I do all the estimating for our company.

Q. Well, you and Mr. Mayham came to the city of Rochester for the purpose of preparing the bid on this work for your company?

A. Yes, sir.

Q. Do you recollect how many days you spent in doing that?

126 A. We were there about three or four days and walked over a portion of the line—about 12 miles; I do not remember where it started.

Q. And that took in what is covered by contracts No. 1 and 2?

A. No; only contract No. 2.

Q. The material which your company furnished was in connection with contract No. 1, was it not?

A. The material we furnished was under a separate contract; I suppose it was in connection with No. 1.

Q. Did you submit the bid of your company to the executive board?

A. Yes.

Q. And to whom did you give it?

A. Mr. Nevill.

Q. In respect to time, when was your bid read with reference to that of the complainant?

A. I cannot remember those details.

Q. Do you recollect whether your bid was read before or after theirs?

A. I could not say; my impression is that it was afterwards; I cannot say positively on that point.

Q. Is it not a fact that objection was made by the board to the form in which the plaintiff's bid was presented and that the bid was laid aside and read after the other bids were read?

A. I remember the board's attention being called to the form in which the bid was presented, but I am not clear on the point; I cannot remember it.

Q. So that you will not undertake to testify whether or not the bid of the plaintiff was read first or after some of the other bids were read?

A. Not positively.

Q. Now, do you recollect the objections as to the form in which the plaintiff's bid was presented?

A. Yes; the bid was on one blank and the bond separate.

Q. I wish to ask you as to the irregularity of the form which was presented—what conversation was had concerning the matter?

127 A. Mr. Neville called attention to the way the bid was presented and Mr. Burlingame explained that his bond had come too late to permit him to enter his figures in the form with the bond.

Q. Was Mr. Moffett also present?

A. Yes.

Q. And how long did he remain there?

A. I do not remember; I think he was there all the time.

Q. You think he was there until all the bids were read?

A. That is my impression.

Q. So that if any objections were raised to the form of the bid presented by the plaintiffs, or any statement made by Mr. Burlingame, Mr. Moffett would have heard them?

A. Yes.

Q. During that meeting did Mr. Moffett have anything to say?

A. I do not recollect.

Q. It is possible, is it not, Mr. Porter, to present a low bid on a particular item in a contract, and still make a profit on the contract by reason of a higher price being paid on some other item?

A. Well, that is possible, yes.

Q. So that, assuming that 50 cents per cubic yard for earth exca-

vation was a low bid on that item, it did not follow from that that the bid itself was an unprofitable one?

A. No, that would not follow; that is, in ordinary cases such a thing might happen. It is often done; one item bid on low, but usually a minor item.

By Mr. MARSHALL:

Q. I understand you to say that, while you cannot say absolutely the order in which the bids were read, do you wish to change your testimony, it is your best impression that the Moffett, Hodgkins & Clarke bid was read before the others?

A. That is my impression.

JOHN E. PORTER.

Complainant rests.

128 EXHIBIT 1 OF MARCH 24, 1894.

ROCHESTER, N. Y., *Jan.* 11, 1893.

Hon. Geo. W. Aldridge, chairman executive board, Rochester, N. Y.

SIR: Referring to the proposals opened on Friday, Dec. 23, 1892, which included (1), the construction of a masonry conduit for water from Hemlock lake northerly about twelve thousand (12,000) feet; and (2), the construction of a riveted steel pipe conduit from the north end of said masonry conduit about one hundred and forty-four thousand (144,000) feet to Mt. Hope reservoir, we, as bidders upon such work, take this opportunity of defining our position:

We are informed that your honorable body has decided to divide said proposals, and to let the work separately to two several contractors. We desire to protest against such a course. When we submitted our proposal, we did so with the express understanding, and we were led to believe, that, although the two sections of conduit were separately described, they in fact constituted a continuous piece of work, and that one bidding on both sections, whose bids were lower in the aggregate than other bids for the same work, should be awarded the contract. Accordingly, with such understanding of the situation, we prepared our schedules of prices for the several sections, enclosed both in a single package into one envelope, annexing the several parts to each other by rubber bands, and thus enclosed deposited them with the proper officer of the executive board as a single proposal for the entire work. The proposal
129 bearing our signature left the blanks provided therein for the insertion of prices unfilled, but contained a reference to the schedules of prices annexed, which we requested to have incorporated in our bid. This leaves no room for doubt that it was our intention to have our prices for both sections of the work read together, as a single proposal. Had we intended to submit two separate bids, we should have enclosed them in separate envelopes and marked them as separate proposals, as required by the specifications. As it was, by placing both set of figures under one cover, our proposal to the executive board was to take a contract for the whole work, or none at all.

We assume that you will recollect the circumstances attending the opening of our bid, which, at the very time of its presentation, attracted attention to the extent of provoking the comment that our method of bidding was informal and irregular.

While it was our purpose, considering the short period allotted to us for familiarizing ourselves with the voluminous specifications, to comply as well as we could, with their requirements, we intended in our communications to your board to convey no other proposal than one for the entire work, and not one for a mere section of it, and we shall insist in the courts, should it become necessary for us to do so, that we are either entitled to a contract for both sections of the work, or to take the ground that, since our proposal was indivisible, that we cannot be compelled to accept a contract for one of the sections only. We have been thus advised by our counsel, and we shall take the position here outlined before the proper tribunals, should it become necessary.

We further desire to call your attention to the fact, which you will likewise recollect, that immediately upon the opening of the bid our engineer, Mr. Burlingame, who entered the prices
130 bid for the work in the schedule submitted, called to your attention the discovery that he had made two clerical errors in copying his figures, while entering them in the statement of prices for work on line B of the steel-pipe conduit, both in respect to the earth excavation and the tunnelling. Reference to the prices proposed for the same character of work on line A demontrates that the error committed was purely clerical. The manifest insufficiency of the prices inserted for these two classes of work on line B, as is shown by the bids of our competitors, and the fairness of the prices charged for the same work on line A, which were substantially the same as those specified by our competitors, also establish the fact that the error was a clerical one. A mere glance of the figures shows that the price for tunnelling must have been intended to be $15 per foot and not $1.50 per foot, and for earth excavation in the trench 70 cents per yard and not 50 cents per yard.

Allowing us for these items of work on line B the prices which we charge therefor on line A, our bid for the steel-conduit line is still far below that of any of our competitors. The law regulating your official action warrants us in taking into consideration these facts, and in permitting us to correct these manifest errors, particularly since they have not misled any other bidder, and since the city which you represent, will not be thereby deprived of any legal or moral right or the benefit of honest competition. We apprehend that neither you, nor the community which you represent, desire to take advantage of a technicality or of a clerical error, or to profit by blunders of so undoubted a character as those indicated, and we are convinced that every fair-minded citizen will be swift to recognize the broad equity and the apparent justice of our position.

131 Of course if under the circumstances you shall persist, not only in ignoring the fact that our proposal upon the whole work was intended as an indivisible one, and at the same time in withholding from us the relief to which we claim to be en-

titled, with respect to the correction of the clerical error of our engineer we shall feel compelled to seek such redress as we are advised by our counsel, it is within the power of the court to grant us. We should greatly deplore the necessity which would force us to resort to such measures, for we appreciate the importance to your city of a speedy increase of its water supply, and the fact that the course suggested by us would involve great and unavoidable delay in attaining that desired end; yet, convinced of the justice of our position, a sense of duty to ourselves requires us to seek self-protection by all legitimate methods. We therefore respectfully request either that the contract in its entirety for both sections of the work be awarded to us, at the corrected prices, or that we may be allowed to withdraw our proposal and to have our bid returned to us.

Respectfully yours,

MOFFETT, HODGKINS & CLARKE CO.,
By J. F. MOFFETT, *Pres't.*

132 EXHIBIT 2. March 24, 1894.

United States Circuit Court, Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY
vs.
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, William W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, N. Y. } In Equity.

The above-named complainant having filed in the office of the clerk of this court a verified bill of complaint and the schedules thereto consisting of a tabulated statement of the bids received by the defendants for the work to be performed under a proposed contract known as contract No. 2 for a riveted steel pipe conduit for the water works of the defendant, of copies of the resolutions adopted by the executive board of the city of Rochester on January 12, 1893, with respect to said contract, of a copy of the bond filed by the complainant with the defendants upon the presentation of its proposals for contract No. 2 of the pamphlet entitled "Rochester water works, 1892. Notice of letting and forms of proposal, contract and specifications for contract No. 2 for constructing steel-pipe conduit and appurtenances for the city of Rochester, N. Y.;" and the allegations of said complaint having been duly
133 considered, and said complainant having also presented to me at this time the affidavits of Edwin H. Burlingame and Louis Marshall, and a notice of motion for an injunction in conformity with the prayer of relief contained in said bill of complaint, which motion is noticed before me at the court-rooms of the United States circuit court on the — day of January, 1893, at the city of Utica, N. Y., and it appearing to my satisfaction that unless the defendants should in the meantime and until the hearing and

determination of said motion be restrained as requested in and by said notice of motion, the said complainant would suffer irreparable injury; now, on motion of Louis Marshall, Esq., of counsel for the complainant, it is

Ordered that the defendants above named, and each and every of them, and each and every of their officers, attorneys, agents and clerks, be and they hereby are, under the penalties by law prescribed, restrained and enjoined until the further order of the court in the premises, from in any way declaring the complainant herein in default with respect to the proposals made by it for the work of laying a 36-inch pipe on line "B" and furnishing the materials therefor specified in contract No. 2 hereinbefore referred to, from declaring the bond executed by and on behalf of the complainant also hereinbefore referred to, forfeited from in any manner suing upon or attempting to enforce or collect the said bond and from entering into contract No. 1 referred to in the bill of complaint herein with any other person, firm or corporation.

Dated Albany, N. Y., January 18, 1893.

(Signed) ALFRED C. COXE, *U. S. J.*

134 EXHIBIT 1 B. March 10, 1894.

Exhibit 1 B, 10th March, 1894, is in all respects like Exhibit 1 A, except in the following particulars:

On page 14, the paragraph immediately following the caption, is as follows:

"To the executive board of the city of Rochester, N. Y.:

The undersigned hereby declare that they are the only persons interested in this proposal; that the same is made in good faith, without any collusion or connection with any other person or persons making any other proposal for the work named; that they have carefully examined the annexed notice of letting, specifications and form of contract and bonds, also the general plans and locality of the work therein referred to; that they fully understand the meaning of said notice, specifications, contract and bonds, and will fully comply with all the terms therein set forth; that they will provide all necessary machinery, tools, apparatus and other means for construction, and furnish all required materials and perform all labor of every description called for by said notice, specifications and contract in the manner and under the terms and conditions therein prescribed; and that they will faithfully construct and complete the proposed work for the consideration of and at the following sums or prices, viz: See annexed schedule of prices in duplicate form of contract which are made part of this bid as though incorporated herein."

No prices are filled in on pages 14 to 38, inclusive.

On page 38, under the caption Time for Completion of Work, appears the following:

"dddd. Least number of consecutive days after execution of con-

tract required to complete the whole work four hundred days (400)."

135 On page 39, opposite the words "Signature of person, firm or corporation making this bid," appears the signature:

"Moffett, Hodgkins & Clarke Co., by C. T. Moffett, sec'y. Post-office address, 16–22 William street, New York. Dated Dec. 22, 1892."

After the words "Following are the full names and residences of all persons who are interested as principals in this bid," appears in writing, the following:

"None outside of Moffett, Hodgkins & Clarke Co."

Pages 40 to 47, inclusive, which, in Exhibit 1 A, are in blank, are as follows:

(40)

"Following are the full names and residences of the sureties who will sign the required bonds of the contract, if this bid is accepted:

Sureties on bond for performance of contract.	Henry D. Lyman, of New York city. American Surety Co., New York city.
Sureties on bond for payment of workmen's wages.	Henry D. Lyman, N. Y. American Surety Co., N. Y.

"Following is a list of similar public works executed by the bidder, and of persons to whom the executive board is referred for information as to the qualifications and business standing of the bidder:

"Have constructed about seventy (70) different water-works systems, including Peoria, Illinois ($2,000,000). Including Butte, Montana (15 miles of conduit pipe from reservoir amounting to $1,500,000)."

136 (41)

"*Proposal Bond.*

"Know all men by these presents: That we, the Moffett, Hodgkins & Clarke Co., as principal, and Henry D. Lyman, of New York city and the American Surety Company of New York having an office and principal place of business at 160 Broadway, in the city and county of New York State of New York as sureties, parties of the first part, are held and firmly bound unto the City of Rochester, New York, party of the second part, in the sum of ninety thousand dollars ($90,000.00), lawful money of the United States of America to be paid to the said city of Rochester, its successors or assigns, for which payment, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

"Sealed this 22d day of December in the year of our Lord one thousand eight hundred and ninety-two."

"Whereas, the executive board of the city of Rochester, N. Y., has advertised for sealed proposals for furnishing material and for manufacturing and delivering a riveted steel pipe conduit, 38 inches or 40 inches in diameter, and laying the same, by one of two routes designated as route 'A' and route 'B,' respectively, in the annexed notice of letting, and constructing all the required appurtenances thereto, commencing at the north end of the contemplated masonry conduit, near Hemlock Lake, Livingston Co., N. Y., and terminating at Mt. Hope reservoir, in said city; and said Moffett, Hodgkins & Clarke Co. principal has made a proposal to said city of Rochester, bearing date the 22d day of December 1892, for the construction of the aforesaid work, which proposal is hereto annexed:

137 (42)

"Now, therefore, the condition of this obligation is such, that, if the said proposal of said Moffett, Hodgkins & Clarke Co. is accepted by said board, and if said Moffett, Hodgkins & Clarke Co. shall perform the work, or furnish the materials, or both, mentioned in such proposal, and shall at such time and place as may be required by said board, well and truly enter into the contract with said city, hereto attached, and give the bonds and undertakings and sureties therein required, without fraud or delay, then this obligation shall be void, otherwise to be and remain in full force and effect; and

"Whereas, the damages that may be sustained by said party of the second part from any default or failure on the part of said Moffett, Hodgkins & Clarke Co. principal as aforesaid, are certain and the proof thereof by legal evidence is difficult, if not impossible:

"Now, therefore, it is covenanted and agreed by and between the parties hereto, and each of them, and made an express condition of this obligation, that for a failure and default on the part of said Moffett, Hodgkins & Clarke Co. principal to enter into said written contract and give said bonds, undertakings and sureties, or to do either, the damages payable and recoverable upon this bond shall not be the penalty therefor, but shall be the sum of ninety thousand dollars ($90,000.00), and interest thereon from the date of such default. The said sum is hereby agreed upon and fixed as reasonable under the circumstances, and that which shall be paid by the obligators above named as liquidated damages hereon."

138 (43)

"In witness whereof, the said Henry D. Lyman has hereunto set his hand and seal and the said afore-bounden corporation principal and surety have hereunto caused their respective corporate seals to

be affixed and these presents signed by their respective duly authorized officers, this 22d day of December, 1892

Signature of principal and sureties:

MOFFETT, HODGKINS & CLARKE CO.,
By J. F. MOFFETT, *President.*
HENRY D. LYMAN, [SEAL.]
AMERICAN SURETY COMPANY OF NEW YORK,
By W. L. TRENHOLM, *President.*
WM. E. KEYES, *Secretary.*"

[American Surety Company Seal.]

(44)

"(*Acknowledgment for Individuals.*)

STATE OF NEW YORK, }
County of New York, City of New York, } *ss:*

On this 22d day of December, 1892, before me the subscriber, personally appeared Henry D. Lyman, to me known to be the same person described in and who executed the foregoing instrument, and he duly acknowledged that he executed the same.

[Seal of Louis E. Carman, Notary Public, New York County.]

L. E. CARMAN,
Notary Public, No. 83, *New York County.*

Certificate filed in Kings Co."

139 (45)

"STATE, CITY, AND COUNTY OF NEW YORK, *ss:*

"On this 22d day of December, 1892, before me personally appeared W. L. Trenholm, president of the American Surety Company, with whom I am personally acquainted, who being by me duly sworn, said: That he resided in the city of New York; that he is the president of the American Surety Company of New York; that he knew the corporate seal of said company; that the seal affixed to the foregoing instrument is such corporate seal; that it was affixed by order of the board of directors of said company, and that he signed said instrument as president of said company by like authority; and that the liabilities of said company do not exceed its assets as ascertained in the manner provided in section 3, chapter 486, of the New York Session Laws of 1881. And the said W. L. Trenholm further said that he was acquainted with Wm. E. Keyes and knew him to be the secretary of said company; that the signature of said Wm. E. Keyes, subscribed to the said instrument, is in the genuine handwriting of the said Wm. E. Keyes, and was thereto

subscribed by the like order of the said board of directors, and in the presence of him, the said W. L. Trenholm, president.

[Seal of Louis E. Carman, Notary Public, New York County.]

L. E. CARMAN,
Notary Public, No. 83, New York County.

Certificate filed in Kings county."

140 " Fidelity bonds guarantee. Incorporated April 14, 1884.

American Surety Company of New York.

General offices, No. 160 Broadway.

Financial Statement, June 30, 1892.

Resources:

	Market Value.		
United States Government's	$292,500.00		
New York City Consolidated stock	100,000.00		
Consolidated Gas Company stock	11,500.00		
Western Union Telegraph Company stock	112,800.00		
Cleve'd, Cin'ti, Chicago and St. Louis R'w'y Co. stock	48,000.00		
Missouri, Kansas & Texas Railway Company bonds	28,000.00		
St. Louis, Iron Mountain and So. R'w'y Company bonds	15,300.00		
The State Trust Company stock	392,040.00		
		$1,000,140.00	
Real estate and improvements		225,732.44	
First liens and mortgages		298,569.12	
Demand loans and bills receivable		27,462.60	
Accrued interest, dividends and rents		18,192.23	
Cash in banks and office		25,852.10	
Premiums in course of collection		47,714.51	
			$1,643,663.00

Liabilities:

Capital stock	1,000,000.00	
Premium-reserve requirement	261,993.47	
Claims in process of adjustment	137,027.79	
Net surplus	244,641.74	
		1,643,663.00

141 CITY AND COUNTY OF NEW YORK, *ss:*

Wm. E. Keyes, being duly sworn, deposes and says, that he is the secretary of the American Surety Company of New York; that the foregoing is a true and correct statement of the financial condition of said surety company, as of June 30, 1892, to the best knowledge, information and belief of deponent. That on the 1st day of October, 1892, the capital stock of said company was increased to two million dollars, and five hundred thousand added to the surplus.

WM. E. KEYES.

Sworn to before me this 22d day of December, 1892.

L. E. CARMAN,
Notary Public, No. 83, New York County.

(*Acknowledgment for a Corporation.*)

STATE OF NEW YORK, }
County of New York, City of New York, } *ss.:*

On this 22d day of December, 1892, before me the subscriber, personally appeared T. F. Moffett, to me personally known, who being by me duly sworn, did depose and say: I am the president of the Moffett, Hodgkins & Clarke Co.; the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said J. F. Moffett, as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

[Seal of Fred. D. Rounds, Notary Public, N. Y. County.]

F. D. ROUNDS,
Notary Public, N. Y. County.

142 (46)

(*Justification for Personal Sureties.*)

STATE OF NEW YORK, }
County of New York, City of New York, } *ss.:*

Henry D. Lyman, one of the sureties within named, being duly sworn, deposes and says that he resides in the city of New York, N. Y, and is a householder in said city; that he is worth the sum of twenty-five thousand dollars over and above all debts and liabilities which he owes, or has incurred, and exclusive of property exempt by law from levy and sale under an execution.

HENRY D. LYMAN.

(Signature of sureties.)

Subscribed and sworn to before me, this 22d day of December, 1892.

[Seal of Louis E. Carman, Notary Public, New York County.]

L. E. CARMAN,
Notary Public, No. 83, *New York County.*

Certificate filed in Kings county.

143 (47)

(*Justification for a Surety Company.*)

STATE OF NEW YORK, }
County of New York, City of New York, } *ss.:*

Wm. L. Trenholm, being duly sworn, deposes and says: I am the president of American Surety Company of New York, a company duly incorporated and organized under the laws of the State of New

York, for the purpose of furnishing bonds and sureties to or for any person, firm or corporation desiring the same; said American Surety Company of New York is worth the sum of one hundred and eighty thousand dollars over and above all debts now existing against said American Surety Company of New York, either by way of bond, mortgage or certificates of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

W. L. TRENHOLM.

Subscribed and sworn to before me this 22d day of December, 1892.

[Seal of Louis E. Carman, Notary Public, New York County.]

L. E. CARMAN,
Notary Public, No. 83, New York County.

Certificate filed in Kings Co.

The remaining pages, from 49 to 165, both inclusive, together with the diagrams appended, are in all respects like the pages similarly numbered in Exhibit 1 A.

144 Ex. 1 A. 10th March, '94. C. O. C.

Rochester water works, 1892.

Notice of letting and forms of proposal, contract, and specifications for contract No. 2 for constructing steel-pipe conduit and appurtenances for the city of Rochester, N. Y.

145 Rochester water works, 1892.

Notice to Contractors.

OFFICE OF THE EXECUTIVE BOARD,
20 CITY HALL, ROCHESTER, N. Y., —— —, 189–.

The executive board of the city of Rochester, N. Y., hereby invite proposals from contractors for the construction of a riveted steel pipe conduit, 38 inches or 40 inches in diameter, and all the required appurtenances thereto, commencing at the north end of the contemplated masonry conduit, which is advertised for letting by said board, simultaneously herewith, and terminating at Mt. Hope reservoir, in said city. The length of such steel pipe required is about 140,000 feet, or 26.5 miles, and the particular diameter that will be adopted by said board will be announced at the time of awarding the contract.

The work is furthermore submitted to contractors for consideration and prices of performance along two different routes over a length of about 8,000 feet of the aforesaid distance, said routes being designated on the maps by the letters "A" and "B."

Route "A" is located in the alluvial flats through which Honeoye creek meanders, and involves several crossings of the existing and former channels of said creek. These crossings are to be made

either by carrying the said conduit pipe on suitable foundations underneath said channels, or by carrying said pipe over said channels upon suitable permanent bridges supported upon proper abutments and piers, as may be determined hereafter in each locality from thorough examinations of the subsoil. If iron bridges are used, the metal-work will be furnished and erected by the executive board.

Route "B" is located wholly on the west side of Honeoye creek, and avoids the said crossings by following the course of a certain lateral valley for some distance, and then returning to the west bank of said creek by means of a masonry conduit and tunnel about 1,000 feet long. Said tunnel and conduit to be provided with the necessary shafts, inlet and overflow chambers, manholes and other appurtenances.

Sealed bids or proposals for the entire work by each of the above-described routes will be received at the office of said board, room 20, city hall, Rochester, N. Y., until 12 o'clock m. of —— —, 189–, at which time and place such bids will be publicly opened by the chairman of said board and read. The said board expressly
146 reserves the right to compare the cost of the work as determined from said bids, with the cost of the similar work that would ensue if cast-iron pipe, 36 inches in diameter, were substituted for said riveted steel pipe, as determined from other bids received at the same time for performing the work with the use of such cast-iron pipe; also the right to choose between said two kinds of pipe and said two routes, and award the work as they may deem for the best interests of the city.

Each bidder is required to state in his proposal, or bid, his name and place of residence; the names and residences of all persons interested with him in said proposal, and if no other person or persons be so interested, he shall distinctly state the fact; also, that said proposal is made in good faith without any collusion or connection with any other person or persons making any proposal or bid for the same work; that he has carefully examined the annexed specifications, and form of contract and bonds prepared by the said board for the work named, and that he fully understands the meaning thereof; that he has examined the general plans and locality of said work; that the prices bid by him for the several items of work are entirely independent of the quantities of such work exhibited in the accompanying statements or in the printed form of proposal, and that said quantities may be varied without limit by said board during the performance of the work without invalidating any of said prices; the shortest period of time which he deems necessary for the completion of the work in full accordance with the plans and specifications; and to give a statement of what similar work he has performed elsewhere, together with references that will enable said board to judge of his qualifications and business standing.

Each bid or proposal must be accompanied by a bond in the penal sum of $90,000, signed by at least two responsible sureties, who may be either householders or freeholders of the city of Rochester, N. Y.,

or surety companies incorporated under the laws of said State of New York, conditioned that the person, firm or corporation making such bid, if it is accepted, will perform the work or furnish the materials, or both, mentioned in such proposal, and at such time and place as may be required by said board, will enter into the annexed contract with said city. The sureties on said proposal bond must be satisfactory to said board.

All bids must be made upon the blank forms furnished by the executive board for the purpose, and the prices for every separate item of work therein named must be plainly and distinctly written with ink, *both in words and figures*, in the proper places left therefor. These prices are to cover all expenses of every character incidental to the completion of the work in full conformity with the provisions of said contract and specifications.

147 The length of time specified by bidders for completing the work as aforesaid will be duly considered in making an award.

Each bid must be signed with ink, by the person or persons making the same, with full names and addresses; and where the proposal is signed by an individual in behalf of a company or corporation, the bid must be accompanied by a properly attested power of attorney or authorization empowering said individual to sign the bid for all members of such company or corporation. Every bid shall be enclosed in a sealed envelope, indorsed "Proposal for performing contract No. 2, Rochester water-works conduit," and addressed to the executive board of the city of Rochester, N. Y., and be delivered to said board or its clerk. After having been so delivered, the bid cannot be withdrawn.

The award of the contract, if awarded, will be made as soon as practicable after the bids have been publicly opened and read. Within five days after the service of a written notice to the successful bidder that such award has been made, said bidder, or the persons making such bid, will be required to attend at the office of the executive board, along with the sureties offered by him or them, and execute in triplicate, the aforesaid contract for the performance of the work in full accordance with the terms thereof; and in case of failure or neglect so to do, he or they will be considered as having abandoned all intention of executing such contract or performing said work.

When the contract is executed, two bonds must be furnished by the contractor, one in the penal sum of $250,000, conditioned for the proper performance of the contract, and the other in the penal sum of $100,000, conditioned for the payment of all workmen's wages; the forms of said bonds are attached to the annexed contract. The sureties on the bond for the performance of the contract may be two or more responsible householders or freeholders of the State of New York, or surety companies incorporated under the laws of said State; and the sureties on the bond for the payment of all workmen's wages must be three or more responsible freeholders of said State, none of whom shall justify in an amount less than $5,000. The adequacy and acceptability of the sureties on both of said bonds

will be determined by said board, and the names of the sureties must be submitted along with said bid or proposal.

The work is to be commenced within ten days after the execution of the contract, and shall be prosecuted with all possible regularity and energy until its completion.

The following is a statement, based upon the estimate of the engineer, of the approximate quantities of the various classes
148 of work, and of the nature and extent, as near as now practicable, of the work required, if route "A" is adopted; and the bids received therefor will be tested, compared and canvassed by the quantities and qualities therein set forth.

Statement of Items and Quantities of Work if Route "A" is Adopted.

a. Twenty (20) acres grubbing and clearing.

b. Fifty-five thousand (55,000) cubic yards of earth excavation in roadway grading and constructing permanent new channels for water-courses carried over the conduit.

c. Twenty-two hundred (2,200) cubic yards of rock excavation in roadway grading and constructing permanent new channels for water-courses carried over the conduit.

d. One hundred and eighty-four thousand (184,000) cubic yards of earth excavation in open trenches or pits for the conduit, gate vaults, blow-offs, overflows, bridges, railroad crossings, creek crossings and culverts.

e. Eight thousand (8,000) cubic yards of rock excavation in open trenches or pits for the conduit, gate vaults, blow-offs, overflows, bridges, railroad crossings, creek crossings and culverts.

f. Thirteen thousand (13,000) cubic yards of excavated material, of any kind and from any source, to be hauled over 1,000 feet distance.

g. Twenty-two hundred (2,200) cubic yards concrete masonry with natural cement for foundations, backing and walls of the conduit, gate vaults, blow-offs, overflows, bridges, railroad crossings, creek crossings, culverts and other structures.

h. Two hundred (200) cubic yards brick masonry in Portland cement in gate vaults, overflows, culverts and other structures.

i. Two hundred (200) cubic yards cut-stone masonry in Portland cement for copings, etc., of bridge abutments and piers, railroad crossings, gate vaults, overflows, culverts and other structures.

j. Five hundred (500) cubic yards second-class stone masonry in natural cement for such portions of bridge abutments and piers, and railroad crossings, as project above the surface of the ground.

k. Eight hundred (800) cubic yards third-class stone masonry in natural cement for bridge abutments and piers, railroad crossings, culverts, foundations of second-class stone masonry below the surface of the ground and other structures.

l. Four hundred (400) cubic yards fourth-class or common rubble masonry in natural cement for foundations, backing and walls of gate vaults, overflows, blow-offs, creek crossings, culverts and other structures.

149 *m.* Two hundred (200) cubic yards screened gravel for foundations of pipe conduit, gate vaults, overflows, culverts and other structures.

n. Two hundred (200) cubic yards broken stone for foundations of pipe conduit, gate vaults, overflows, culverts and other structures.

o. Six hundred (600) cubic yards slope-wall for protecting banks and channels.

p. Six hundred (600) cubic yards stone paving for protecting banks and channels.

q. Fifteen hundred (1,500) cubic yards riprap for protecting banks and channels.

r. Five hundred (500) cubic yards brush and stone for protecting banks and channels.

s. One hundred (100) lineal feet furnishing and laying 36-inch cast-iron water pipe, complete, for connections at reservoirs and elsewhere.

t. One hundred (100) lineal feet furnishing and laying 30-inch cast-iron water pipe, complete, for connections at reservoirs and elsewhere.

u. Three hundred (300) lineal feet furnishing and laying 24-inch cast-iron water pipe, complete, for culverts, overflows and connections.

v. Two hundred (200) lineal feet furnishing and laying 20-inch cast-iron water pipe, complete, for culverts and overflows.

w. One hundred (100) lineal feet furnishing and laying 16-inch cast-iron water pipe, complete, for culverts and overflows.

x. Two hundred (200) lineal feet furnishing and laying 12-inch cast-iron water pipe, complete, for culverts and blow-offs.

y. Two hundred (200) lineal feet furnishing and laying 10-inch cast-iron water pipe, complete, for blow-offs.

z. Two hundred (200) lineal feet furnishing and laying 8-inch cast-iron water pipe, complete, for blow-offs.

aa. Three hundred (300) lineal feet furnishing and laying 6-inch cast-iron water pipe, complete, for blow-offs.

bb. One hundred (100) lineal feet furnishing and laying 20-inch vitrified earthenware pipe, complete, for culverts.

cc. One hundred (100) lineal feet furnishing and laying 18-inch vitrified earthenware pipe, complete, for culverts.

dd. One hundred (100) lineal feet furnishing and laying 15-inch vitrified earthenware pipe, complete, for culverts.

ee. One hundred (100) lineal feet furnishing and laying 12-inch vitrified earthenware pipe, complete, for culverts.

ff. Seven thousand (7,000) lineal feet timber piles in foundations for bridge abutments and piers, creek crossings, pipe conduit, culverts and other structures built in open excavations.

150 *gg.* Nine thousand (9,000) lineal feet timber piles in bents and trestle work for supporting wooden roadway bridges and approaches thereto, at creek crossings where the pipe conduit is carried under the channel.

hh. Thirty-two thousand (32,000) feet B. M. timber and plank put permanently in place in foundations of bridge abutments and piers, railroad crossings, creek crossings, gate vaults, overflows, blow-offs, culverts and other similar structures.

ii. Fifty-six thousand (56,000) feet B. M. timber and plank put permanently in place in the floors and approaches of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel.

jj. Thirty thousand (30,000) feet B. M. white-pine timber placed in trusses of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel; and in white-oak matched plank casings around the pipe conduit, at creek crossings where said pipe is carried over the channel upon permanent iron bridges.

kk. Fifteen thousand (15,000) pounds wrought-iron beams, bolts, rods, ties, steps, straps, hangers, spikes, nails, etc., put permanently in place in wooden roadway bridges, casing for conduit pipe on iron bridges, and foundations of bridge abutments, piers, railroad crossings, creek crossings, gate vaults, overflows, blow-offs, culverts and other structures; also in flanged joints for stop-gates, special castings, blow-offs, air valves, and stiffening and anchor rings for conduit pipe.

ll. Forty-two thousand (42,000) pounds cast-iron beams, braces saddles, gate-vault curbs and covers, washers, etc., put permanently in place in wooden roadway bridges, abutments, railroad crossings, creek crossings, gate vaults, overflows and other structures; also in flanged or other "fittings," riveted to the steel pipe for connections with "special castings" not riveted to said pipe, stop-gates, overflows, blow-offs and air valves.

mm. Two hundred thousand (200,000) pounds "special castings" for angles, bends, overflows, branches and other connections with existing or future pipes, furnished and inserted in line of proposed riveted pipe conduit, or in such other lines of pipe.

nn. Two hundred (200) manholes, with covers and bolts for same, complete, furnished and formed in riveted pipe conduit.

oo. Setting in place eighteen (18) 36-inch stop-valves in pipe conduit.

pp. Setting in place four (4) 30-inch stop-valves in other pipes.

qq. Setting in place four (4) 24-inch stop-valves in other pipes.

rr. Setting in place four (4) 12-inch stop-valves for blow-offs.

ss. Setting in place four (4) 10-inch stop-valves for blow-offs.

151 *tt.* Setting in place ten (10) 8-inch air valves and stop-valves for blow-offs.

uu. Setting in place fifty (50) 6-inch air valves and stop-valves for blow-offs.

vv. Setting in place twenty (20) 5-inch air valves.
ww. Setting in place twenty (20) 4-inch air valves.
xx. Setting in place twenty (20) 3-inch air valves.
yy. Setting in place twenty (20) 2-inch air valves.
zz. One hundred (100) net tons of stop-valves and air valves, with the special fittings appertaining thereto, hauled from nearest railroad stations to points where the same are to be set in place.
aaa. For all coffer-damming, pumping, bailing and draining involved in making eight (8) crossings under channel of Hemlock Lake outlet and Honeoye creek.
bbb. Seventy-eight thousand (78,000) lineal feet 38-inch single-riveted steel pipe and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete in all respects.
ccc. Forty-four thousand (44,000) lineal feet 38-inch double-riveted steel pipe and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete in all respects.
ddd. Seventeen thousand (17,000) lineal feet 38-inch double-riveted steel pipe and special pieces, five-sixteenths ($\frac{5}{16}$) inch in thickness, furnished and laid complete in all respects.
eee. One thousand (1,000) lineal feet 38-inch double-riveted steel pipe and special pieces, three-eighths ($\frac{3}{8}$) inch in thickness, furnished and laid complete in all respects.

Alternate to items *bbb*, *ccc*, *ddd*, and *eee*.

fff. Seventy-eight thousand (78,000) lineal feet 40-inch single-riveted steel pipe and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete in all respects.
ggg. Forty-four thousand (44,000) lineal feet 40-inch double-riveted steel pipe and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete in all respects.
hhh. Seventeen thousand (17,000) lineal feet 40-inch double-riveted steel pipe and special pieces, five-sixteenths ($\frac{5}{16}$) inch in thickness, furnished and laid complete in all respects.
iii. One thousand (1,000) lineal feet 40-inch double-riveted steel pipe and special pieces, three-eighths ($\frac{3}{8}$) inch in thickness, furnished and laid complete in all respects.

The following is a statement, based upon the estimate of the
152 engineer, of the approximate quantities of the various classes of work, and of the nature and extent, as near as now practicable, of the work required, if route "B" is adopted; and the bids received therefor will be tested, compared and canvassed by the quantities and qualities therein set forth.

Statement of Items and Quantities of Work if Route "B" is Adopted

a. Twenty (20) acres grubbing and clearing.
b. Sixty thousand (60,000) cubic yards of earth excavation in roadway grading and constructing permanent new channels for water-courses carried over the conduit.

c. Twenty-two hundred (2,200) cubic yards of rock excavation in roadway grading and constructing permanent new channels for water-courses carried over the conduit.

d. One hundred and eighty-four thousand (184,000) cubic yards of earth excavation in open trenches or pits for the masonry and pipe conduit, gate vaults, blow-offs, overflows, bridges, railroad crossings, creek crossings and culverts.

e. Eight thousand (8,000) cubic yards of rock excavation in open trenches or pits for the masonry and pipe conduit, gate vaults, blow-offs, overflows, bridges, railroad crossings, creek crossings and culverts.

f. Two hundred (200) cubic yards of earth excavation in shaft for tunnel-work.

g. Twenty (20) cubic yards of rock excavation in shaft for tunnel-work.

h. Two thousand (2,000) cubic yards of earth excavation in tunnel for masonry conduit.

i. Two hundred (200) cubic yards of rock excavation in tunnel for masonry conduit.

j. Thirteen thousand (13,000) cubic yards of excavated material, of any kind and from any source, to be hauled over 1,000 feet distance.

k. Sixteen hundred (1,600) cubic yards concrete masonry with natural cement for foundations, backing and walls of the masonry conduit, entrance and overflow chambers, foundations of pipe conduit, gate vaults, blow-offs, railroad crossings, creek crossings, culverts and other structures built in open excavations.

l. Three hundred (300) cubic yards concrete masonry with natural cement for foundations and backing of lining masonry built in the tunnel and shafts.

m. Four hundred (400) cubic yards brick masonry in Portland cement in entrance and overflow chambers, masonry conduit, manholes, gate vaults, culverts and other structures built in open excavations.

153 *n.* Five hundred (500) cubic yards brick masonry in Portland cement in lining of the tunnel and shafts.

o. One hundred (100) cubic yards cut-stone masonry in Portland cement for copings, etc., of entrance and overflow chambers, railroad crossings, gate vaults, manholes, culverts and other structures.

p. One hundred (100) cubic yards second-class stone masonry in natural cement, for such portions of railroad crossings as project above the surface of the ground.

q. Five hundred (500) cubic yards third-class stone masonry in natural cement for railroad crossings, culverts, foundations of second-class stone masonry below the surface of the ground, and other structures.

r. Four hundred (400) cubic yards fourth-class or common rubble masonry in natural cement for foundations, backing and walls of gate vaults, overflows, blow-offs, creek crossings, culverts, and other structures built in open excavations.

s. Ten (10) cubic yards rubble masonry in Portland cement in the masonry conduit, entrance and overflow chambers, manholes, culverts and other structures built in open excavations. (See note below.)

t. Ten (10) cubic yards rubble masonry in Portland cement in the lining of the tunnel and shafts. (See note below.)

u. Two hundred (200) cubic yards screened gravel for foundations of masonry and pipe conduit, gate vaults, overflows, culverts and other structures built in open excavations.

v. Two hundred (200) cubic yards broken stone for foundations of masonry and pipe conduit, gate vaults, overflows, culverts and other structures built in open excavations.

w. Four hundred (400) cubic yards slope-wall for protecting banks and channels.

x. Six hundred (600) cubic yards stone paving for protecting banks and channels.

y. Fifteen hundred (1,500) cubic yards riprap for protecting banks and channels.

z. Five hundred (500) cubic yards brush and stone for protecting banks and channels.

aa. One hundred (100) lineal feet furnishing and laying 36-inch cast-iron water pipe, complete, for connections at reservoirs and elsewhere.

bb. One hundred (100) lineal feet furnishing and laying 30-inch cast-iron water pipe, complete, for connections at reservoirs and elsewhere.

cc. Four hundred (400) lineal feet furnishing and laying 24-inch cast-iron water pipe, complete, for culverts, overflows and connections.

dd. Two hundred (200) lineal feet furnishing and laying 20-inch cast-iron water pipe, complete, for culverts, and overflows.

154 *ee.* One hundred (100) lineal feet furnishing and laying 16-inch cast-iron water pipe, complete, for culverts and overflows.

ff. Two hundred (200) lineal feet furnishing and laying 12-inch cast-iron water pipe, complete, for culverts and blow-offs.

gg. Two hundred (200) lineal feet furnishing and laying 10-inch cast-iron water pipe, complete, for blow-offs.

hh. Two hundred (200) lineal feet furnishing and laying 8-inch cast-iron water pipe, complete, for blow-offs.

ii. Three hundred (300) lineal feet furnishing and laying 6-inch cast-iron water pipe, complete, for blow-offs.

jj. One hundred (100) lineal feet furnishing and laying 20-inch vitrified earthenware pipe, complete, for culverts.

kk. One hundred (100) lineal feet furnishing and laying 18-inch vitrified earthenware pipe, complete, for culverts.

ll. One hundred (100) lineal feet furnishing and laying 15-inch vitrified earthenware pipe, complete, for culverts.

mm. One hundred (100) lineal feet furnishing and laying 12-inch vitrified earthenware pipe, complete, for culverts.

nn. Fifty (50) lineal feet furnishing and driving through earth, 8-inch iron vertical ventilating pipe for tunnel.

oo. Fifty (50) lineal feet, furnishing and driving through earth, 7-inch iron vertical ventilating pipe for tunnel.

pp. Fifty (50) lineal feet, furnishing and driving through earth, 6-inch iron vertical ventilating pipe for tunnel.

qq. Fifty (50) lineal feet drilling 8-inch vertical ventilating hole in rock for tunnel.

rr. Fifty (50) lineal feet drilling 7-inch vertical ventilating hole in rock for tunnel.

ss. Fifty (50) lineal feet drilling 6-inch vertical ventilating hole in rock for tunnel.

tt. Two thousand (2,000) lineal feet timber piles in foundation for masonry conduit, entrance and overflow chambers, railroad crossings, creek crossings, pipe conduit, culverts and other structures built in open excavations.

uu. Seven thousand (7,000) lineal feet timber piles in bents and trestle work for supporting wooden roadway bridges and approaches thereto, at creek crossings where the pipe conduit is carried under the channel.

vv. Fourteen thousand (14,000) feet B. M. timber and plank put permanently in place in foundations of masonry conduit, entrance and overflow chambers, railroad crossings, creek crossings, gate vaults, overflows, blow-offs, culverts and other similar structures built in open excavations.

155 *ww.* Forty-two thousand (42,000) feet B. M., timber and plank put permanently in place in the floors and approaches of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel.

xx. Twelve thousand (12,000) feet B. M., white-pine timber placed in trusses of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel.

yy. Fifteen thousand (15,000) pounds wrought-iron beams, bolts, rods, ties, steps, straps, hangers, spikes, nails, etc., put permanently in place in wooden roadway bridges and foundations of masonry conduit, entrance and overflow chambers, railroad crossings, creek crossings, gate vaults, manholes, blow-offs, culverts, and other structures; also in flanged joints for stop-gates, special castings, blow-offs, air valves, and stiffening and anchor rings for conduit pipe.

zz. Fifty thousand (50,000) pounds cast-iron beams, braces, guides, sluiceways, weirs, saddles, gate-vault curbs and covers, washers, etc., put permanently in place in entrance and overflow chambers, wooden roadway bridges, railroad crossings, creek crossings, gate vaults, manholes and other structures; also in flanged or other "fittings," riveted to the steel pipe for connection with "special castings" not riveted to said pipe, stop-gates, overflows, blow-offs and air valves.

aaa. Two hundred thousand (200,000) pounds "special castings" for angles, bends, overflows, branches and other connections with existing or future pipes, furnished and inserted in line of proposed riveted pipe conduit, or in such other lines of pipe.

bbb. Two hundred (200) manholes, with covers and bolts for same, complete, furnished and formed in riveted pipe conduit.

ccc. Setting in place eighteen (18) 36-inch stop-valves in pipe conduit.

ddd. Setting in place four (4) 30-inch stop-valves in other pipes.

eee. Setting in place four (4) 24-inch stop-valves in other pipes.

fff. Setting in place four (4) 12-inch stop-valves for blow-offs.

ggg. Setting in place four (4) 10-inch stop-valves for blow-offs.

hhh. Setting in place ten (10) 8-inch air valves and stop-valves for blow-offs.

iii. Setting in place fifty (50) 6-inch air valves and stop-valves for blow-offs.

jjj. Setting in place twenty (20) 5-inch air valves.

kkk. Setting in place twenty (20) 4-inch air valves.

lll. Setting in place twenty (20) 3-inch air valves.

mmm. Setting in place twenty (20) 2-inch air valves.

nnn. One hundred (100) net tons of stop-valves and air
156 valves with the special fittings appertaining thereto, hauled from nearest railroad stations to points where the same are to be set in place.

ooo. For all coffer damming, pumping, bailing, and draining involved in making six (6) crossings under channel of Hemlock Lake outlet and Honeoye creek.

ppp. Seventy-seven thousand (77,000) lineal feet 38-inch single-riveted steel pipe and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete in all respects.

qqq. Forty-four thousand (44,000) lineal feet 38-inch double-riveted steel pipe and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness furnished and laid complete in all respects.

rrr. Seventeen thousand (17,000) lineal feet 38-inch double-riveted steel pipe and special pieces, five-sixteenths ($\frac{5}{16}$) inch in thickness, furnished and laid complete in all respects.

sss. One thousand (1,000) lineal feet 38-inch double-riveted steel pipe and special pieces, three-eighths ($\frac{3}{8}$) inch in thickness, furnished and laid complete in all respects.

Alternate to items *ppp*, *qqq*, *rrr*, and *sss*.

ttt. Seventy-seven thousand (77,000) lineal feet 40-inch single-riveted steel pipe and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete in all respects.

uuu. Forty-four thousand (44,000) lineal feet 40-inch double-riveted steel pipe and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete in all respects.

vvv. Seventeen — (17,000) lineal feet 40-inch double-riveted steel pipe and special pieces, five-sixteenths ($\frac{5}{16}$) inch in thickness, furnished and laid complete in all respects.

www. One thousand (1,000) lineal feet 40-inch double-riveted steel pipe and special pieces, three-eighths (⅜) inch in thickness, furnished and laid complete in all respects.

(NOTE.—The items *s* and *t* in the above statement relating to route "B" have been introduced with nominal quantities, with the understanding that said quantities of rubble masonry may be increased at the option of the executive board, to any extent not exceeding those for brick masonry given in the aforesaid items *m* and *n*, respectively, for the purpose of comparing bids, and that the quantities of brick masonry in said items *m* and *n* may be correspondingly reduced.)

The foregoing quantities in both of said statements shall be regarded only as approximations to those which may actually be required in the performance of the work, and the executive board, therefore, expressly reserves the right to make any variations
157 whatever in said quantities, at any time before the commencement or during the progress of the work, as may be deemed expedient by said board, without thereby invalidating any of the prices named in the accepted proposal. Every bidder must form and be governed by his own estimate of the probable quantities of each class of excavation, masonry and other items of work set forth in the said statements of quantities, and of the probable quantities of all the items enumerated in the printed form of proposal furnished by said board; and he shall not, at any time after the submission of any estimate made by the engineer for work performed, dispute or complain of the said statements of quantities, or assert that there was any misunderstanding in regard to the nature or amount of the work to be done, if the actual quantities required of any item prove to be more or less in any degree whatever than the aforesaid quantities, or even if some of the said items should be excluded entirely.

Special attention of contractors is called to the specifications and form of contract under which the work is to be done, also to the foregoing requirements as to form of proposal and character and amount of bonds required.

General plans for the work can be seen and specifications and forms of proposal and contract and bonds can be obtained at the office of the executive board, 20 city hall, Rochester, N. Y.

The executive board expressly reserves the right to reject any or all proposals, and to award the work as it may deem for the best interests of the city.

GEORGE W. ALDRIDGE, *President,*
WILLIAM W. BARNARD,
JOHN U. SCHROTH,
Executive Board.

ROCHESTER WATER WORKS.

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PROPOSAL

FOR

Furnishing Materials and for manufacturing and laying a Riveted Steel Pipe Conduit, 38 inches or 40 inches in diameter, and constructing all the required Appurtenances thereto, commencing at the north end of the contemplated Masonry Conduit, near Hemlock Lake, which is advertised for Letting by the Executive Board of the City of Rochester, N. Y., simultaneously with the work herein referred to, and terminating at Mt. Hope Reservoir, in said City.

To the Executive Board of the City of Rochester, N. Y.:

The undersigned hereby declare...that I he4.....the only person.. interested in this proposal; that the same is made in good faith, without any collusion or connection with any other person or persons making any other proposal for the work named; that...he....ha....carefully examined the annexed notice of letting, specifications and form of contract and bonds, also the general plans and locality of the work therein referred to; that...he...fully understand...the meaning of said notice, specifications, contract and bonds, and will fully comply with all the terms therein set forth; that...he...will provide all necessary machinery, tools, apparatus and other means for construction, and furnish all required materials and perform all labor of every description called for by said notice, specifications and contract in the manner and under the terms and conditions therein prescribed; and that...he... will faithfully construct and complete the proposed work for the consideration of and at the following sums or prices, viz.:

I. IF ROUTE "A," DESCRIBED IN THE ANNEXED NOTICE OF LETTING, IS ADOPTED.

a. For all **Grubbing and Clearing,** including all incidental work, the sum of — Seventy five ($75.—)
per acre of surface actually cleared.

b. For all **Earth Excavation in Roadway Grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **Permanent New Channels**

for Water-Courses carried over the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, bailing and draining, and all incidental work, the sum of

159 Thirty cents ($ .30) per cubic yard.

c. For all **Rock Excavation in Roadway Grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **Permanent New Channels for Water-Courses carried over** the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, bailing and draining, and all incidental work, the sum of one Dollar & fifty cents ($ 1.50) per cubic yard.

d. For all **Earth Excavation in Open Trenches or Pits,** for the pipe conduit, gate-vaults, blow-offs, overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and sheeting, backfilling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, bailing and draining, and all incidental work, the sum of ~~Fifty cents~~ ($ ~~.50~~) per cubic yard.
Seventy cents .70

e. For all **Rock Excavation in Open Trenches or Pits,** for the pipe conduit, gate-vaults, blow-offs, overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and shoring, backfilling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, bailing and draining, and all incidental work, the sum of

Two dollars & fifty cents 2.50) per cubic yard

f. For **Hauling more than 1,000 feet** any excavated material from sides of open excavations, including making and grading of embankments and spoil banks, and all incidental work, the sum of one cent ($ .01) per cubic yard, measured in excavation, for each additional one hundred feet hauled, or fraction thereof greater than fifty feet.

g. For all **Concrete Masonry** mixed in the proportion of one part **Natural Cement,** two parts sand and five parts ballast, deposited and rammed in place in foundations, backing and walls of the conduit, gate-vaults, blow-offs, overflows, bridge abutments and piers, railroad crossings, creek crossings, culverts and other structures, including furnishing,

160 placing and removing all forms and moulds, and all incidental work, the sum of six dollars ($ 6.00) per cubic yard.

h. For all **Concrete Masonry** mixed in the proportion of one part **Portland Cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations, backing and walls of the conduit, gate-vaults, blow-offs, overflows, bridge abutments and piers, railroad crossings, creek crossings, culverts, and other structures, including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of eight dollars ($ 8.00) per cubic yard.

i. For all **Brick Masonry laid with Natural Cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in Foundation Walls of Gate-vaults, Overflows, Culverts and other Structures,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, cleaning, pointing, applying cement wash, and all incidental work, the sum of — Sixteen dollars ($ 16—) per cubic yard.

j. For all **Brick Masonry laid with Portland Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in Foundation Walls of Gate-vaults, Overflows, Culverts and other Structures,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, cleaning, pointing, applying cement wash, and all incidental work, the sum of — Eighteen dollars ($ 18.) per cubic yard.

k. For all **Cut Stone Masonry and Copings** laid with Portland cement mortar, mixed in the proportion of two and one-half parts sand to one part cement, in bridge abutments and piers, railroad crossings, gate-vaults, overflows, culverts and other structures, including cleaning, pointing, and all incidental work, the sum of Fifty dollars ($ 50—) per cubic yard

l. For all **Second Class Stone Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, for such portions of bridge abutments and piers, and railroad crossings, as project above the surface of the ground, including furnishing, placing and removing staging, cleaning, pointing, and all incidental work, the sum of Sixteen dollars ($ 16—) per cubic yard.

m. For all **Second Class Stone Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part

cement, for such portions of bridge abutments and piers, and railroad crossings, as project above the surface of the ground, including furnishing, placing and removing staging, cleaning, pointing, and all incidental work, the sum of Eighteen dollars (~~$~~ 18 —) per cubic yard.

n. For all **Third Class Stone Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, for bridge abutments and piers, railroad crossings, culverts, foundations of second class stone masonry below the surface of the ground, and other structures, including furnishing, placing and removing staging, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of Twelve dollars (~~$~~ 12 —) per cubic yard.

o For all **Third Class Stone Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, for bridge abutments and piers, railroad crossings, culverts, foundations of second class masonry below the surface of the ground, and other structures, including furnishing, placing and removing staging, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of Fourteen dollars (~~$~~ 14 —) per cubic yard.

p. For all **Fourth Class or Common Rubble Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, for foundations, backing and walls of gate-vaults, overflows, blow-offs, creek crossings, culverts and other structures, including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of ~~Ten dollars~~ Eight dollars (~~$~~ ~~10~~ 8 —) per cubic yard.

q. For all **Fourth Class or Common Rubble Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, for foundations, backing and walls of gate-vaults, overflows, blow-offs, creek crossings, culverts and other structures, including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of Ten dollars (~~$~~ 10 —) per cubic yard.

r. For all **Screened Gravel** deposited in foundations of pipe conduit, bridge abutments and piers, railroad crossings, gate-vaults, overflows,

blow-offs, culverts and other structures, including ramming in place, and all incidental work, the sum of Two dollars (162) ($ 2 —) per cubic yard.

s. For all **Broken Stone** deposited in foundations of pipe conduit, bridge abutments and piers, railroad crossings, gate-vaults, overflows, blow-offs, culverts and other structures, including ramming in place, and all incidental work, the sum of One dollar & fifty cents ($ 1.50) per cubic yard.

t. For all **Slope Wall** laid dry for protecting the sides of earthen embankments excavations and channels of water-courses, including all incidental work, the sum of Three dollars & fifty cents ($ 3.50) per cubic yard.

u For all **Stone Paving** laid for protecting the sides of earthen embankments and excavations, the channels of water-courses, and the bottoms of culverts, including all incidental work, the sum of Five dollars — ($ 5 —) per cubic yard.

v. For all **Rip-Rap** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of Two dollars & fifty cents ($ 2.50) per cubic yard.

w. For all **Brush and Stone** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of Two dollars — ($ 2 —) per cubic yard.

x. For all **36-inch Cast-iron Water Pipe** for connections at reservoirs and elsewhere, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of nine dollars ($ 9 —) per lineal foot.

y. For all **30-inch Cast-iron Water Pipe** for connections at reservoirs and elsewhere, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of Six dollars & fifty cents ($ 6.50) per lineal foot.

z. For all **24-inch Cast-iron Water Pipe** for culverts, overflows and connections at reservoirs and elsewhere, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of Four dollars ($4) per lineal foot.

aa. For all **20-inch Cast-iron Water Pipe** for culverts and overflows, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of Three dollars ($3) per lineal foot.

bb. For all **16-inch Cast-iron Water Pipe** for culverts and overflows, furnished and laid with hot lead joints, complete in every respect, including all incidental work the sum of Two dollars & twenty five cts ($2.25) per lineal foot.

cc. For all **12-inch Cast-iron Water Pipe** for culverts, overflows and blow-offs, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of One dollar & fifty cents ($1.50) per lineal foot.

dd. For all **10-inch Cast-iron Water Pipe** for blow-offs, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of one dollar & twenty cents ($1.20) per lineal foot.

ee. For all **8-inch Cast-iron Water Pipe** for blow-offs, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of Ninety cents ($.90) per lineal foot.

ff. For all **6-inch Cast-iron Water Pipe** for blow-offs, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of Sixty five cents ($.65) per lineal foot.

gg. For all **20-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of One dollar & twenty five cents ($1.25) per lineal foot.

hh. For all **18-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of ~~_____~~ 4
One dollar ($ 1) per lineal foot.

ii. For all **15-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints complete in every respect, including all incidental work, the sum of ~~_____~~
Eighty cents ($ .80) per lineal foot.

jj. For all **12-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of ~~_____~~
Seventy cents ($ .70) per lineal foot.

kk. For all **Timber Piles** furnished, driven and left in place in foundations for conduit, bridge abutments and piers, railroad crossings, creek crossings, gate-vaults, overflow chambers, culverts and other structures, including all incidental work, the sum of ~~_____~~
Thirty-five cents ($ .35) per lineal foot.

ll. For all **Timber Piles** furnished, driven and left in place in bents and trestle work for supporting wooden roadway bridges and approaches thereto, at creek crossings where the pipe conduit is carried under the channel, including all incidental work, the sum of ~~_____~~
Thirty-five cents ($ .35) per lineal foot

mm. For all **Timber and Plank** furnished and put permanently in place in foundations of conduit, bridge abutments and piers, railroad crossings, creek crossings, gate-vaults, overflows, blow-offs, culverts and other similar structures, including all incidental work, the sum of ~~_____~~
Thirty five dollars ($ 35) per thousand feet, B. M.

nn. For all **Timber and Plank** furnished and put permanently in place in the floors and approaches of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel, including all incidental work, the sum of Forty five dollars ~~_____~~
~~Forty dollars~~ ($ 45) per thousand feet, B. M.

oo. For all **White Pine Timber** furnished and put permanently in place in trusses of wooden roadway bridges, at creek crossings where the pipe

conduit is carried under the channel; and for all **white oak plank** 165 matched and planed, for casings around the pipe conduit where said pipe is carried over the channel upon permanent iron bridges, including painting, and all incidental work, the sum of ~~_____~~

Sixty dollars ($60—) per thousand feet, B. M.

pp. For all **Wrought-iron Work,** such as beams, bolts, rods, ties, steps, straps, hangers, spikes, nails, etc., furnished and put permanently in place wherever required in wooden roadway bridges, casing for pipe conduit on iron bridges, in the masonry or foundations of bridge abutments and piers, railroad crossings, creek crossings, gate-vaults, overflows, blow-offs, culverts and other structures, also in flanged joints for stop gates, special castings, blow-offs, air-valves, and stiffening and anchor rings for the pipe conduit, including coating, and all incidental work, the sum of ~~_____~~

Three and one half cents ($.03½) per pound.

qq. For all **Cast-iron Work,** such as beams, braces, saddles, gate-vault curbs and covers, washers, etc., furnished and put permanently in place wherever required in any masonry or foundation, or in wooden roadway bridges, railroad crossings, creek crossings, gate-vaults, overflows and other structures; also for all castings or "**Fittings,**" other than man-holes, which are riveted to any course of the steel pipe conduit; also for all boxes and covers for valves of every description pertaining to said conduit; including all necessary pattern-making, machine-work, coating, hauling, fitting, setting, connecting, furnishing and placing gaskets, and all incidental work, the sum of ~~_____~~

three and one half cents ($.03½) per pound.

rr. For all "**Special Castings,**" such as branches, reducers, sleeves, curves, bends angle and wedge-shaped pieces, which are not riveted to any course of the steel pipe conduit, but which may be substituted for similar riveted special pieces in the line of said conduit; also for all such castings of every description which may be required in the line of any branch or appurtenance of said conduit, or in the line of the existing conduit and its branches at various points; including all necessary pattern-making, machine-work, coating, hauling, fitting, setting, connecting, making hot lead joints in case of sockets, and furnishing and placing gaskets in case of flange joints, and all incidental work, the sum of ~~_____~~

~~_____~~ Five cents ~~_____~~ ($.05) per pound.

ss. For each **Man-hole** furnished and formed in the steel pipe conduit, with covers, chains, bridge-trees, gaskets and bolts, complete in every respect,

including all necessary pattern-making, machine-work, coating, hauling, fitting, setting, connecting, furnishing and placing gaskets, and all incidental work, the sum of

166 Sixteen dollars — ($16.—) for each man-hole.

tt. For setting each **36-inch Stop-valve** and appurtenances thereto in place in the line of the pipe conduit, or for reservoir or other connections, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of Twenty five dollars ($25.—) for each valve.

uu. For setting each **30-inch Stop-valve** and appurtenances thereto in place for any required or contemplated connection with reservoirs or the existing or any future conduit, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of Eighteen dollars — ($18.—) for each valve

vv. For setting each **24-inch Stop-valve** and appurtenances thereto, in place in any required alteration or adaptation of the existing conduit and its branches, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of Fifteen dollars ($15.—) for each valve.

ww. For setting each pair of **12-inch Blow-off Valves** and appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of Ten dollars ($10.—) for each blow-off

xx. For setting each pair of **10-inch Blow-off Valves** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of Eight dollars ($8.—) for each blow-off.

yy For setting each combined **8-inch Air-valve or Pair of Blow-off Valves** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of Eight dollars ($8.—) for each air-valve or blow-off.

zz For setting each combined **6-inch Air-valve or Pair of Blow-off Valves** and the appurtenances thereto, in the re uired position, includ-

ing all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of ~~_____~~

167 Six dollars — ($ 6 —) for each air-valve or blow-off.

aaa. For setting each combined **5-inch Air-valve** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of

Six dollars — ($ 6 —) for each air-valve.

bbb. For setting each combined **4-inch Air-valve** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of

Five dollars — ($ 5 —) for each air-valve.

ccc. For setting each combined **3-inch Air-valve** and the appurtenances thereto in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of

Four dollars ($ 4 —) for each air-valve.

ddd. For setting each combined **2-inch Air-valve,** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of

— Three dollars ($ 3. —) for each air-valve.

eee. For **Hauling all Stop-valves, Blow-off Valves and Air-valves,** with the special fittings appertaining thereto, from their point of delivery by the Executive Board to their proper destination in the work, including handling, inspecting, storing, weighing, guaranteeing same against damage, and all incidental work, the sum of Two dollars and fifty cents — ($ 2.50) per net ton (2,000 lbs.)

fff. For all **Coffer-damming, Pumping, Bailing and Draining** involved at each place where the pipe conduit may be laid under the channel of Hemlock Lake outlet or Honeoye Creek, including removal of all coffer-dams, piles, sheeting, or other obstructions, and all labor or damage caused by unforeseen contingencies, and all incidental work, the gross sum of Fifteen hundred dollars ($ 1500.) for each crossing.

ggg. For all **38-inch Single-riveted Steel Conduit Pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, test-

ing, keeping in repair for twelve months, and all incidental work, the sum
168 of Four dollars & thirty five cents ($ 4.35) per lineal foot.

hhh For all **38-inch Double-riveted Steel Conduit Pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing keeping in repair for twelve months, and all incidental work, the sum of Four dollars & thirty five cents ($ 4.35) per lineal foot

iii. For all **38-inch Double-riveted Steel Conduit Pipe** and special pieces, five-sixteenths (5/16) inch in thickness, furnished and laid complete, including manufacturing coating, transporting, laying, connecting, testing keeping in repair for twelve months, and all incidental work, the sum of Five dollars & forty four cents ($ 5.44) per lineal foot.

jjj. For all **38-inch Double-riveted Steel Conduit Pipe** and special pieces, three-eighths (3/8) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Six dollars & fifty cents ($ 6.50) per lineal foot.

ALTERNATE to ITEMS ggg, hhh, iii and jjj.

kkk. For all **40-inch Single-riveted Steel Conduit Pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Four dollars & ~~fifty~~ sixty cents ($ 4.60) per lineal foot.

lll. For all **40-inch Double-riveted Steel Conduit Pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Four dollars & sixty cents ($ 4.60) per lineal foot.

mmm. For all **40-inch Double-riveted Steel Conduit Pipe** and special pieces, five-sixteenths (5/16) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Five dollars & seventy five cents ($ 5.75) per lineal foot.

nnn. For all **40-inch Double-riveted Steel Conduit Pipe** and special pieces, three-eighths (3/8) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, test-

ing, keeping in repair for twelve months, and all incidental work, the sum of Six dollars & ninety cents ($ 6.90) per lineal foot.

TIME FOR COMPLETION OF WORK.

000 **Least Number of Consecutive Days** after execution of Contract required to complete the whole work ( )

II. IF ROUTE "B," DESCRIBED IN THE ANNEXED NOTICE OF LETTING, IS ADOPTED.

a For all **Grubbing and Clearing**, including all incidental work, the sum of Seventy five dollars ($ 75.—) per acre of surface actually cleared.

b. For all **Earth Excavation in Roadway Grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **Permanent New Channels for Water-courses** carried **over** the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, bailing and draining, and all incidental work, the sum of Thirty cents ($ .30) per cubic yard.

c. For all **Rock Excavation in Roadway Grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **Permanent New Channels for Water-courses** carried **over** the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, bailing and draining, and all incidental work, the sum of one dollar & fifty cents ($ 1.50) per cubic yard.

d. For all **Earth Excavation in open Trenches or Pits,** for the masonry and pipe conduit, entrance and overflow-chambers, gate-vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and sheeting, backfilling of trenches and masonry, making embankments and other final disposal of

170 the excavated material with haul of 1,000 feet or less, bailing and draining, and all incidental work, the sum of ——— Fifty cents ——— ($ .50) per cubic yard.

e. For all **Rock Excavation in Open Trenches or Pits,** for the masonry and pipe conduit, entrance and overflow-chambers, gate-vaults, blow-offs, pipe over-flows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit including bracing and shoring, backfilling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, bailing and draining, and all incidental work, the sum of ——— Two dollars & fifty cents ($ 2.50) per cubic yard

f. For all **Earth Excavation in Shafts** for tunnel, including all necessary bracing, timbering, backfilling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping, bailing and draining, and all incidental work, the sum of ——— One dollar ——— ($ 1.—) per cubic yard.

g. For all **Rock Excavation in Shafts** for tunnel, including all necessary bracing, timbering, backfilling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping bailing and draining, and all incidental work, the sum of ——— Six dollars ——— ($ 6.—) per cubic yard.

h. For all **Earth Excavation in Tunnel,** including all necessary bracing, timbering, lighting, ventilating, removal and backfilling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping, bailing and draining, and all incidental work, the sum of ——— One dollar & fifty cents ($ 1.50) per cubic yard.

i. For all **Rock Excavation in Tunnel,** including all necessary bracing, timbering, lighting, ventilating, removal and backfilling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping, bailing and draining, and all incidental work, the sum of ——— Ten dollars ——— ($ 10.—) per cubic yard.

For **Hauling more than 1,000 Feet** any excavated material from sides of open excavations, or from ends of tunnel or tops of shafts, including making and grading of embankments and spoil banks, and all incidental work, the sum of one cent ($ .01)

171 per cubic yard, measured in excavation, for each additional one hundred feet hauled, or fraction thereof greater than fifty feet.

k. For all **Concrete Masonry** mixed in the proportion of one part **Natural Cement,** two parts sand and five parts ballast, deposited and rammed in place in foundations backing and walls of the entrance and overflow-chambers, masonry and pipe conduit, gate-vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, culverts and other structures, built **in open excavation,** including furnishing, placing and removing all moulds and forms and all incidental work, the sum of

— Six dollars — ($ 6 —) per cubic yard.

l. For all **Concrete Masonry** mixed in the proportion of one part **Portland Cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations, backing and walls of the entrance and overflow-chambers, masonry and pipe conduit, gate-vaults, blow offs, pipe overflows, bridges, railroad crossings, creek crossings, culverts, and other structures, built **in open excavation,** including furnishing, placing and removing all moulds and forms and all incidental work, the sum of

— Eight dollars — ($ 8 —) per cubic yard.

m. For all **Concrete Masonry** mixed in the proportion of one part **Natural Cement,** two parts sand and five parts ballast, deposited and rammed in place in foundations and backing of lining masonry built **in the Tunnel and shafts,** including furnishing, placing and removing all moulds and forms, and all incidental work, the sum of

— Seven dollars ($ 7 —) per cubic yard.

n. For all **Concrete Masonry** mixed in the proportion of one part **Portland Cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations and backing of lining masonry built **in the Tunnel and Shafts,** including furnishing, placing and removing all moulds and forms, and all incidental work, the sum of

Nine dollars ($ 9 —) per cubic yard.

o. For all **Brick Masonry laid with Natural Cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in Foundations and Walls of Entrance and Overflow-Chambers, Conduit, Gate-vaults, Pipe Overflows, Culverts and other Structures, built in open excavations,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, cleaning, pointing, applying cement wash, and all incidental work, the sum of Sixteen dollars

($ 16 —) per cubic yard.

p. For all **Brick Masonry laid with Portland Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in Foundations and Walls of Entrance and Overflow-Chambers, Conduit, Gate-vaults, Pipe Overflows, Culverts and other Structures, built in open excavations,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, cleaning, pointing, applying cement wash and all incidental work, the sum of Eighteen dollars ($ 18—) per cubic yard.

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q. For all **Brick Masonry laid with Natural Cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in the Tunnel and Shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of Twenty five dollars ($ 25—) per cubic yard.

r. For all **Brick Masonry laid with Portland Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the Tunnel and Shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of Twenty seven dollars ($ 27—) per cubic yard.

s. For all **Cut Stone Masonry and Copings** laid with Portland cement mortar, mixed in the proportion of two and one-half parts sand to one part cement, in entrance and overflow-chambers, shafts, man-holes, bridges, railroad crossings, gate-vaults and other structures, including cleaning, pointing, and all incidental work, the sum of ———— Fifty dollars ($ 50—) per cubic yard.

t. For all **Second Class Stone Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, for such portions of bridge abutments and piers, and railroad crossings, as project above the surface of the ground, including furnishing, placing and removing staging, cleaning, pointing, and all incidental work, the sum of Sixteen dollars ($ 16—) per cubic yard.

u. For all **Second Class Stone Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, for such portions of bridge abutments and piers, and railroad crossings, as project above the surface of the ground, including furnishing, placing and removing staging, cleaning, pointing, and all incidental work, the sum of Eighteen dollars ($ 18—) per cubic yard.

v. For all **Third Class Stone Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, for bridge abutments and piers, railroad crossings, culverts, foundations of second class stone masonry below the surface of the ground, and other structures, including furnishing, placing and removing staging, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of Twelve dollars ($12—) per cubic yard.

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w. For all **Third Class Stone Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, for bridge abutments and piers, railroad crossings, culverts, foundations of second class masonry below the surface of the ground, and other structures, including furnishing, placing and removing staging, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of Fourteen dollars —— ($14—) per cubic yard.

x. For all **Fourth Class or Common Rubble Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, for foundations, backing and walls of the entrance and overflow-chambers, masonry and pipe conduit, man-holes, gate-vaults, pipe overflows, blow-offs, creek crossings, culverts and other structures **built in open excavations,** including, furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of Eight dollars —— ($8——) per cubic yard.

y. For all **Fourth Class or Common Rubble Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, for foundations, backing and walls of the entrance and overflow-chambers, masonry and pipe conduit, man-holes, gate-vaults, pipe overflows, blow-offs, creek crossings, culverts and other structures, **built in open excavations,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of —— Ten dollars ($10—) per cubic yard.

z. For all **Fourth Class or Common Rubble Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, **in the Tunnel and Shafts,** includ-

ing furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of .....

174 Eighteen dollars ($ 18 —) per cubic yard.

aa For all **Screened Gravel** deposited in foundations of the entrance and overflow-chambers, masonry and pipe conduit, gate-vaults, pipe overflows, blow-offs, railroad crossings, creek crossings, culverts and other structures, built in open excavations, including ramming in place, and all incidental work, the sum of .....

Two dollars ($ 2 —) per cubic yard.

bb For all **Broken Stone** deposited in foundations of the entrance and overflow-chambers, masonry and pipe conduit, gate-vaults, pipe overflows, blow-offs, railroad crossings, creek crossings, culverts and other structures, built in open excavations, including ramming in place, and all incidental work, the sum of one dollar & fifty cents —

($ 1.50) per cubic yard.

cc. For all **Slope Wall** laid dry for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of Three dollars & fifty cents

($ 3.50) per cubic yard.

dd. For all **Stone Paving** laid for protecting the sides of earthen embankments and excavations, the channels of water-courses, and the bottoms of culverts, including all incidental work, the sum of .....

— Five dollars ($ 5 —) per cubic yard.

ee. For all **Rip-Rap** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of .....

Two dollars — ($ 2.00) per cubic yard.

ff. For all **Brush and Stone** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of .....

One dollar & fifty cents ($ 1.50) per cubic yard.

gg. For all **36-inch Cast-iron Water Pipe** for connections at reservoirs

and elsewhere, furnished and laid with hot lead joints, complete in every

5 respect, including all incidental work, the sum of ——————

Nine dollars —— ($ 9 —) per lineal foot.

hh For all **30-inch Cast-iron Water Pipe** for connections at reservoirs and elsewhere, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of ——————

Six dollars & fifty cents ($ 6.50) per lineal foot.

ii. For all **24-inch Cast-iron Water Pipe** for culverts, overflows and connections at reservoirs and elsewhere, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of

Four dollars ($ 4 —) per lineal foot.

jj For all **20-inch Cast-iron Water Pipe** for culverts and overflows, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of ——————

Three dollars ($ 3. —) per lineal foot.

kk. For all **16-inch Cast-iron Water Pipe** for culverts and overflows, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of ——————

Two dollars & twenty-five cents ($ 2.25) per lineal foot.

ll. For all **12-inch Cast-iron Water Pipe** for culverts, overflows and blow-offs, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of ——————

One dollar & fifty cents ($ 1.50) per lineal foot.

mm. For all **10-inch Cast-iron Water Pipe** for blow-offs, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of ——————

One dollar & twenty cents ($ 1.20) per lineal foot.

nn. For all **8-inch Cast-iron Water Pipe** for blow-offs, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of ——————

Ninety cents ($ .90) per lineal foot.

oo. For all **6-inch Cast-iron Water Pipe** for blow-offs, furnished and laid

176 with hot lead joints, complete in every respect, including all incidental work, the sum of ——— sixty-five cents ($.65) per lineal foot.

pp. For all **20-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of one dollar & twenty-five cents ——— ($1.25) per lineal foot.

qq. For all **18-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of ——— One dollar ($1—) per lineal foot.

rr. For all **15-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of ——— eighty cents ($.80) per lineal foot

ss. For all **12-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of ——— seventy cents ($.70) per lineal foot.

tt. For all **8-inch Heavy Wrought-iron Well Tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of ——— Two dollars ——— ($2—) per lineal foot.

uu. For all **7-inch Heavy Wrought-iron Well Tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of ——— one dollar & sixty cents ($1.60) per lineal foot.

vv. For all **6-inch Heavy Wrought-iron Well Tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of ——— One dollar & thirty cents ($1.30) per lineal foot.

www. For all **Tunnel Ventilation Holes 8 inches in Diameter,** drilled

yyy through ledge rock from the bottom of the eight-inch tubing to the top of the tunnel, including all incidental work, the sum of Three dollars ($ 3—) per lineal foot.

xx. For all **Tunnel Ventilation Holes 7 inches in Diameter,** drilled through ledge rock, from the bottom of the seven-inch tubing to the top of the tunnel, including all incidental work, the sum of Two dollars & eighty cents ($ 2.80) per lineal foot.

yy. For all **Tunnel Ventilation Holes 6 inches in Diameter,** drilled through ledge rock, from the bottom of the six-inch tubing to the top of the tunnel, including all incidental work, the sum of Two dollars & seventy five cents ($ 2.75) per lineal foot.

zz. For all **Timber Piles** furnished, driven and left in place in foundations for entrance and overflow-chambers, masonry and pipe conduit, bridge abutments and piers, railroad crossings, creek crossings, gate-vaults, pipes, overflows, blow-offs, culverts and other structures, including all incidental work, the sum of Thirty five cents ($ .35) per lineal foot.

aaa. For all **Timber Piles** furnished, driven and left in place in bents and trestle work for supporting wooden roadway bridges and approaches thereto, at creek crossings where the pipe conduit is carried under the channel, including all incidental work, the sum of Thirty five cents ($ .35) per lineal foot.

bbb. For all **Timber and Plank** furnished and put permanently in place in foundations of entrance and overflow-chambers, masonry and pipe conduit, bridge abutments and piers, railroad crossings, creek crossings, gate-vaults, pipe overflows, blow-offs, culverts and other similar structures, including all incidental work, the sum of Thirty five dollars ($ 35) per thousand feet, B. M.

ccc. For all **Timber and Plank** furnished and put permanently in place in the floors and approaches of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel, including all incidental work, the sum of Forty five dollars ($ 45—) per thousand feet, B. M.

ddd. For all **White Pine Timber** furnished and put permanently in place in trusses of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel; and for all **white oak plank** matched and planed, for casings around the pipe conduit where said pipe is carried over the channel upon permanent iron bridges, including painting and all incidental work, the sum of ——————

78 Sixty dollars ($60.00) per thousand feet, B. M.

eee. For all **Wrought-iron Work** such as beams, bolts, rods, ties, steps, straps, hangers, spikes, nails, etc., furnished and put permanently in place wherever required in wooden roadway bridges, casing for pipe conduit on iron bridges, in the masonry or foundations of the entrance and overflow-chambers, shafts, man-holes, bridge abutments and piers, railroad crossings, creek crossings, gate-vaults, pipe overflows, blow-offs, culverts and other structures, also in flanged joints for stop-gates, special castings, blow-offs, air-valves, and stiffening and anchor rings for the pipe conduit, including coating and all incidental work, the sum of ——————

Three & one-half cents ($.03½) per pound.

fff. For all **Cast-iron Work** such as beams, braces, saddles, gate-vault curbs and covers, washers, etc., furnished and put permanently in place wherever required in any masonry or foundation of the entrance and overflow-chambers, shafts, man-holes, abutments, or in wooden roadway bridges, railroad crossings, creek crossings, gate-vaults, pipe overflows and other structures; also for all castings or "**Fittings**," other than man-holes, which are riveted to any course of the steel pipe conduit; also for all boxes and covers for valves of every description pertaining to said conduit; including all necessary pattern-making, machine-work, coating, hauling, fitting, setting, connecting, furnishing and placing gaskets, and all incidental work, the sum of

Three & one Half cents ($.03½) per pound.

ggg. For all "**Special Castings**," such as branches, reducers, sleeves, curves, bends, angle and wedge-shaped pieces, which are not riveted to any course of the steel pipe conduit, but which may be substituted for similar riveted special pieces in the line of said conduit; also for all such castings of every description which may be required in the line of any branch or appurtenance of said conduit, or in the line of the existing conduit and its branches at various points; including all necessary pattern-making, machine-work, coating, hauling, fitting, setting, connecting, making hot lead joints in case of sockets, and furnishing and placing gaskets in case of flange joints, and all incidental work, the sum of

Five cents ($.05) per pound.

hhh. For each **Man-hole** furnished and formed in the steel pipe conduit, with covers, chains, bridge-trees, gaskets and bolts, complete in every respect, including all necessary pattern-making, machine-work, coating, hauling, fitting, setting, connecting, furnishing and placing gaskets, and all incidental work, the sum of ——— (179)

Sixteen dollars ($16.—) for each man-hole.

iii. For setting each **36-inch Stop-valve** and appurtenances thereto in place in line of the pipe conduit, or for reservoir or other connections, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of ———

Twenty five dollars ($25.—) for each gate.

jjj. For setting each **30-inch Stop-valve** and appurtenances thereto in place for any required or contemplated connection with reservoirs or the existing or any future conduit, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of ———

eighteen dollars ($18.) for each valve.

kkk. For setting each **24-inch Stop-valve** and appurtenances thereto, in place in any required alteration or adaptation of the existing conduit and its branches, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of

Fifteen dollars ($15.—) for each valve.

lll. For setting each pair of **12-inch Blow-off Valves** and appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of

— Twelve dollars ($12.—) for each blow-off.

mmm. For setting each pair of **10-inch Blow-off Valves** and the appurtenances thereto in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of

— Ten dollars ($10.—) for each blow-off.

nnn. For setting each combined **8-inch Air-valve or Pair of Blow-off Valves** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of Eight dollars ($8.—) for each air-valve or blow-off.

ooo. For setting each combined **6-inch Air-valve or Pair of Blow-off Valves** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of 180 ——————————
Six dollars ($ 6.—) for each air-valve or blow-off.

ppp. For setting each combined **5-inch Air-valve** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of
Six dollars ($ 6.—) for each air-valve.

qqq. For setting each combined **4-inch Air-valve** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of
Five dollars ($ 5.—) for each air-valve.

rrr. For setting each combined **3-inch Air-valve** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of
Four dollars ($ 4.—) for each air-valve.

sss. For setting each combined **2-inch Air-valve**, and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of
— Three dollars — ($ 3.—) for each air-valve.

ttt. For **Hauling all Stop-valves, Blow-off Valves and Air-valves,** with the special fittings appertaining thereto, from their point of delivery by the Executive Board to their proper destination in the work, including handling, inspecting, storing, weighing, guaranteeing same against damage, and all incidental work, the sum of Two dollars & fifty cents ($ 2.50) per net ton (2,000 lbs.)

uuu. For all **Coffer-damming, Pumping, Bailing and Draining** involved at each place where the pipe conduit may be laid under the channel of Hemlock Lake outlet or Honeoye Creek, including removal of all coffer-dams, piles, sheetings, or other obstructions, and all labor or damage caused by unforeseen contingencies, and all incidental work, the gross sum of * Eight Hundred ($ 800.—) for each crossing.

vvv. For all **38-inch Single-riveted Steel Conduit Pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete

181 including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Four dollars & thirty-six cents ($ 4.36) per lineal foot.

wwww. For all **38-inch Double-riveted Steel Conduit Pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Four dollars & thirty-six cents ($ 4.36) per lineal foot.

xxxx. For all **38-inch Double-riveted Steel Conduit Pipe** and special pieces, five-sixteenths (5/16) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Five dollars & forty-four cents ($ 5.44) per lineal foot.

yyyy. For all **38-inch Double-riveted Steel Conduit Pipe** and special pieces, three-eighths (3/8) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Six dollars & fifty cents ($ 6.50) per lineal foot.

ALTERNATE to ITEMS vvv, wwww, xxx, and yyy.

zzz. For all **40-inch Single-riveted Steel Conduit Pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Four dollars & sixty cents ($ 4.60) per lineal foot.

aaaa. For all **40-inch Double-riveted Steel Conduit Pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Four dollars & sixty cents ($ 4.60) per lineal foot.

bbbb. For all **40-inch Double-riveted Steel Conduit Pipe** and special pieces, five-sixteenth (5/16) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Five dollars & seventy-five cents ($ 5.75) per lineal foot.

cccc. For all **40-inch Double-riveted Steel Conduit Pipe** and special pieces, three-eighths (3/8) inch in thickness, furnished and laid complete,

including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of Six dollars & ninety cents ($ 6.90) per lineal foot

TIME FOR COMPLETION OF WORK.

dddd. **Least Number of Consecutive Days** after execution of Contract required to complete the whole work.....

.....(.....)

It is distinctly understood that the quantities referring to the various items of work exhibited in the statements contained in the annexed notice of letting, are only approximations to those which may actually be required in the performance of the work, and that the same have been submitted merely as a basis for the comparison of this proposal with others; also, that the right is expressly reserved to the Executive Board to make any variations whatever in said quantities, at any time before the commencement or during the progress of the work, as may be deemed necessary or expedient by said Board, without thereby invalidating any of the prices above named.

It is also understood that the Executive Board may accept either of the two schedules of prices above submitted, according as Route "A" or "B" described in the annexed Notice of Letting, may be adopted by said Board.

The undersigned will commence the work within ten days after the execution of the contract, and will progress therewith to its completion within the period above named, in accordance with all the terms of said contract.

Accompanying this proposal is a bond in the penal sum of ninety thousand dollars ($90,000), conditioned that if this proposal shall be accepted by said Board, according to either of the two routes mentioned,

the undersigned will perform the work or furnish the materials, or both, mentioned in this proposal, and will, at such time and place as may be required by said Board, well and truly enter into the annexed contract with said City.

Signature of person, firm or corporation making this bid

Post Office Address, _____

Dated _____

Following are the full names and residences of all persons who are interested as principals in this bid :—

NOTE.—The names of bidders may be published; but the names of all parties interested with them are submitted for the information and guidance of the Executive Board alone, and are *not* to be made public. If any corporation is so interested, its name along with the names of the president, treasurer and manager thereof, is herewith submitted.

Following are the full names and residences of the sureties who will sign the required bonds of the contract if this bid is accepted:—

Sureties on bond for performance of contract.

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Sureties on bond for payment of workmen's wages.

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Following is a list of similar public works executed by the bidder, and of persons to whom the Executive Board is referred for information as to the qualifications and business standing of the bidder:—

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185 **PROPOSAL BOND.**

Know all Men by These Presents That

principal , and

sureties, parties of the first part, are held and firmly bound unto the City of Rochester, New York, party of the second part, in the sum of ninety thousand dollars, ($90,000.00), lawful money of the United States of America, to be paid to the said city of Rochester, its successors or assigns, for which payment, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed this day of
in the year of our Lord one thousand eight hundred and ninety-

Whereas, The executive board of the city of Rochester, N. Y., has advertised for sealed proposals for furnishing material and for manufacturing and delivering a riveted steel pipe conduit, 38 inches or 40 inches in diameter, and laying the same, by one of two routes designated as route "A" and route "B," respectively, in the annexed notice of letting, and constructing all the required appurtenances thereto, commencing at the north end of the contemplated masonry conduit, near Hemlock Lake, Livingston Co., N. Y., and terminating at Mt. Hope reservoir, in said city; and said

principal , ha made a proposal to said city of Rochester, bearing date the day of 189 , for the construction of the aforesaid work, which proposal is hereto annexed:

186 **Now, Therefore,** The condition of this obligation is such that, if the said proposal of said

is accepted by said board, and if said

shall perform the work, or furnish the materials, or both, mentioned in such proposal, and shall at such time and place as may be required by said board, well and truly enter into the contract with said city, hereto attached, and give the bonds and undertakings and sureties therein required, without fraud or delay, then this obligation shall be void, otherwise to be and remain in full force and effect; and

Whereas, The damages that may be sustained by said party of the second part from any default or failure on the part of said

principal

as aforesaid, are certain and the proof thereof by legal evidence is difficult, if not impossible:

Now, Therefore, It is covenanted and agreed by and between the parties hereto, and each of them, and made an express condition of this obligation, that for a failure and default on the part of said

principal

to enter into said written contract and give said bonds, undertakings and sureties, or to do either, the damages payable and recoverable upon this bond shall not be the penalty therefor, but shall be the sum of ninety thousand dollars ($90,000.00), and interest thereon from the date of such default. The said sum is hereby agreed upon and fixed as reasonable under the circumstances, and that which shall be paid by the obligators above named as liquidated damages hereon.

187 **In Witness Whereof,**

this day of 189

Signature of principal and sureties.

188 (*Acknowledgment for Individuals.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } ss.:

On this day of 189 , before me, the subscriber, personally appeared

to me known to be the same persons described in and who executed the foregoing instrument, and they severally duly acknowledged that they executed the same.

189 (*Acknowledgment for a Corporation.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } ss.:

On this day of 189 , before me the subscriber, personally appeared to me personally known, who, being by me duly sworn, did depose and say: I am the president of the

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

(*Acknowledgment for a Corporation.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } ss.:

On this day of 189 , before me the subscriber, personally appeared to me personally known, who, being by me duly sworn, did depose and say: I am the president of the

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

190 (*Justification for Personal Sureties.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } ss.:

sureties within named, being duly sworn, depose and say, and each for himself says, that he resides in the city of Rochester, N. Y., and said

over and above all debts and liabilities which he owes, or has incurred, and exclusive of property exempt by law from levy and sale under an execution.

Signature of sureties.

Subscribed and sworn to before me this day of 189 .

191 (*Justification for a Surety Company.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } ss.:

being duly sworn, deposes and says: I am the president of

a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm, or corporation desiring the same; said

is worth the sum of
dollars, over and above all the debts now existing against said

either by way of bond, mortgage, or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of
189 .

192 (*Justification for a Surety Company.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } *ss.:*

being duly sworn, deposes and says: I am the president of

a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm, or corporation desiring the same; said

is worth the sum of
dollars, over and above all the debts now existing against said

either by way of bond, mortgage, or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of 189 .

193 **ROCHESTER WATER WORKS.**

Form of agreement, to be executed in triplicate, two of which are to be kept by the executive board of the city of Rochester, N. Y., and one to be delivered to the contractor.

CONTRACT AND SPECIFICATIONS

FOR

Furnishing materials and for manufacturing and laying a riveted steel-pipe conduit ..... inches in diameter, and constructing all the required appurtenances thereto, commencing at the north end of the contemplated masonry conduit near Hemlock lake, Livingston Co., N. Y., and terminating at Mt. Hope reservoir, in the city of Rochester, N. Y.

This agreement made and entered into this ..... day of ..... in the year one thousand eight hundred and ninety-.... by and between the City of Rochester, N. Y., acting by and through the executive board of said city by virtue of the power vested in said executive board by the charter of said city, party of the first part, and

....

.....

... .

as contractor and party of the second part:

Witnesseth, That the said parties hereto, each in consideration of the covenants and agreements on the part of the other herein contained, have covenanted and agreed, and by these presents do covenant and agree to and with each other, and for themselves, their heirs, executors, administrators, successors, and assigns, and the party of the second part also covenants and agrees under the conditions expressed in the bonds bearing even date with these presents and hereunto annexed, as follows:

1. **Definitions.**—The word "board," or a pronoun in place of it, when used in this contract, is

understood to mean the executive board of the city of Rochester, N. Y., and their successors or assigns; the word "engineer," or a pronoun in place of it, the chief engineer of said board,
194 or his successor in office, acting either directly, or through his properly authorized agents, such agents acting within the scope of the particular duties intrusted to them; the words "chief engineer," the chief engineer of said board, or his successor in office, and him only; the word "contractor," or a pronoun in place of it, the person or persons, copartnership or copartnerships, corporation or corporations, that have entered into this contract as the party of the second part, and his, its or their heirs, executors, administrators, successors or assigns; the word "city," the city of Rochester, New York, party of the first part, its successors or assigns.

2. **Work.**—The contractor hereby covenants and agrees that he will, at his own cost and expense, furnish and provide all the materials, tools, implements, machinery, apparatus, and other appliances, and perform all the work, labor, and services, required to construct, build, and put in complete working order, according to route .... as defined in the notice of letting hereto annexed, A RIVETED STEEL-PIPE CONDUIT .... INCHES IN DIAMETER, AND ALL THE REQUIRED APPURTENANCES THERETO, commencing at the north end of the contemplated masonry conduit near Hemlock lake, Livingston Co., N. Y., and terminating at Mt. Hope reservoir in said city, in a good, substantial and workmanlike manner to the satisfaction of said board and said chief engineer, in strict conformity in every part and particular to the following specifications, which are hereby made a part of this contract, and also in strict conformity with such plans, drawings, and explanatory or subordinate directions as said engineer shall furnish from time to time for the proper fulfillment of this contract:

SPECIFICATIONS.

General description of work.

3. **General description.**—The work to be done under these specifications consist in doing all the necessary grubbing and clearing of the surface, within the limits of the right of way acquired by the city; in making all necessary excavations and embankments for the construction and grading of a suitable roadway for the transportation of materials at such places along said right of way and

elsewhere as may be designated by the engineer; in constructing all necessary pipe and masonry culverts, or other channels for natural and artificial water-courses, under said embankments; in constructing all temporary or permanent timber, pile and trestle bridges, along with the necessary masonry and approaches thereto, that may be required over any stream; in constructing all masonry needed for permanent bridges, culverts, railroad crossings, creek crossings, overflows, and other structures; in paving the channels of water-courses and protecting the slopes of embankments
195 or excavations wherever required; in manufacturing, furnishing, delivering, laying and testing all required.....inch riveted steel pipe and the necessary special pieces and fittings for the conduit; in furnishing, inspecting, delivering, laying and testing all required cast-iron pipe and special castings for the conduit and the required connections, blow-offs, overflows and culverts; in inspecting, hauling and setting all water gates, valves and other appliances pertaining to the conduit, which may be furnished by the executive board; in excavating in earth or rock all required trenches or pits for laying the pipe conduit and its appurtenances, and for building the structures pertaining thereto; in making, maintaining and removing all necessary cofferdams where the pipe is to be laid under large streams, and providing suitable channels for carrying natural water courses, both temporarily and permanently, over the conduit; in constructing any pipe or masonry culverts under the conduit, where directed by the engineer; in doing all necessary pumping, bailing, draining, sheeting and shoring of the sides of the conduit trench and other excavations; in making all required embankments under and over said conduit; also, in case that route "B," described in the annexed notice of letting, is adopted by the executive board, in the construction of a masonry water conduit, from 6 to 6½ feet high and wide inside, of circular or horseshoe-shaped section, built both in tunnel and open excavation in either earth or rock, or both, together with the required entrance and overflow substructures, and all necessary culverts, manholes, shafts and ventilation tubes for such masonry conduit.

Items of work to be done.

4. The contractor is, furthermore, to make the required excavations in earth, rock or other material, in accordance with the plans and directions

of the engineer, or for the convenient and faithful execution of the work in accordance with such plans; to make all provisions necessary for maintaining the safety of the public, as well as the travel on public and private roads, and to protect from injury all buildings, fences, culverts, drain-tile, drainage ditches, water pipes, natural water-courses, and the existing water-works conduit with its appurtenances, and to promptly repair all damage done to such objects, structures and appurtenances; to construct all required foundations and put in place all necessary stone-work, brick-work, metal-work and timber-work; to refill all trenches, shafts and excavations for said conduit in accordance with the plans and directions of the engineer; to clear away and remove all rubbish and surplus material of every description; to furnish all materials except such as the executive board may elect to provide, as hereinafter mentioned, and all tools, implements, appliances and labor of every description, required to build and put in complete working order the said riveted steel and masonry conduit.

Right to change location of conduit and quantities exhibited.

196 5. The executive board reserves the right to change the location of the said conduit and its appurtenances, at any time before the commencement, or during the progress of the work, and to any extent which it may deem expedient, from the lines and routes indicated upon the plans at the time of letting the work, also to modify or wholly change the relative quantities of the different items of work contemplated to be performed at said time; and the contractor shall not have or make any claim for extra compensation in consequence of any such changes of location, route or quantities.

Substitution of tunnel-work for open-trench work, and conversely, in case route "B" is adopted.

6. The places where it is now believed that the excavation for the masonry conduit contemplated in route "B" is to be made in tunnel and in open trench, respectively, with the limits of each, are shown upon the maps or plans; but if, in the opinion of the engineer, the nature of the material to be excavated at any point, or other conditions of the case shall render it advisable, said engineer may require any part of the excavation shown on said plans to be in tunnel, to be made in open trench; and conversely, he may require any part of the excavation shown on said plans to be in open trench, to be made in tunnel. No allowance for any such change of method of excavation will

be made beyond the prices bid per cubic yard for the different classes of excavation.

Diagrams showing limits of excavation and masonry to be paid for if route "B" is adopted.

7. The appended diagrams marked No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14, entitled "Diagrams exhibiting limits of excavation and masonry in open-trench and tunnel work that will be estimated for payment" and signed by E. Knichling, chief engineer, Nov. 1, 1892, determine the lines according to which estimates of the excavation and masonry required in the construction of the masonry conduit, will be made if route "B" is adopted.

Distinction between lining masonry and backing or filling masonry.

8. Attention is called to the fact that in the said diagrams, and also in the following specifications, a distinction has been made between the brick or rubble masonry which forms the interior shell or "lining" of the conduit, and the concrete or rubble masonry which forms the "backing" or the "filling" of the conduit, in open-trench and tunnel excavation, respectively; this distinction being rendered necessary only for the purpose of defining the limits of excavation for which payment will be made. In further explanation of said diagrams, it is to be understood that the "lining masonry" thereupon indicated, for the masonry conduit in open trench and in tunnel, shall in each case be uniform in thickness, which thickness shall be not less than eight (8) inches for the roof and sides, and not less than four (4) inches for the bottom or invert, where lining may be required for the latter.

Construction plans exhibited may be altered.

9. The construction plans in the office of the chief engineer, exhibited at the time of the letting and numbered VII, VIII, IX, X, XI, XII, XIII,
197 XIV, XV, XVI, XVII and XVIII, show in a general manner the route of the conduit and the types of some of the various structures to be built under these specifications. The exact forms and route cannot be determined in advance, as they may be modified in view of the prices bid, and of the quality and location of materials found as the work progresses; therefore, said plans shall be regarded as approximate both in dimensions, character of material and relative position. As the work advances definite plans and directions will be furnished by the engineer, and the work shall be done in accordance therewith.

Water gates, fittings and pipe furnished by board.

10. **Materials to be provided by the executive board.**—The executive board will provide and deliver, at the nearest available railroad sta-

tions to the conduit, all necessary water gates, valves, and the fittings appertaining thereto. The contractor shall transport said materials from the points of delivery by said board, and shall store the same in the vicinity of the works, and be responsible for loss incurred or damage done to said materials from the time of their delivery untill the work is completed and finally accepted. For such transportation, storage, and responsibility, payment will be made at the price bid per net ton (2,000 lbs.) for hauling said materials. Any other expense to the contractor involved in said work must be included in the prices bid per lineal foot for furnishing and laying the pipe connected with such valves. All reasonable effort will be made to have the said materials delivered in ample season, but delay on the part of the said board in furnishing the same shall not give cause to the contractor for claims for damages. Should such delay occur, the time for completing the work shall be extended as the engineer may deem necessary.

Payment for transporting and storing said materials.

Width in different localities.

11. **Right of way.**—The right of way in, over, and through private lands for the construction of the conduit and its appurtenances is in general 66 feet wide in shallow cuttings, 99 feet wide in deep cuttings, and 33 feet wide in tunnel. The contractor shall not enter or occupy with men, tools or materials, any land outside of the limits of the right of way obtained by the executive board, without having first acquired, at his own expense, the right to do so from the proper parties; and he will also be required to observe strictly all conditions and restrictions that may be incorporated in any easement affecting this work, and will be held responsible for any damage done by him or his employees to any adjoining property or premises. At all places where, in the opinion of the engineer, more space may be required for purposes of construction, larger areas of right of way than above defined will be provided by the executive board.

Responsibility for damages.

Fences to be maintained.

12. **Fences.**—Wherever it may be deemed expedient or necessary for the protection of life or property, the contractor shall erect and
198 maintain suitable fences, at his own expense, along roadways and around the grounds occupied by him, such fences to conform to the directions of the engineer and to the requirements of the easements as aforesaid, and to

be removed after the completion of the work in the loyality in question.

Temporary bridges or crossings.

13. **Bridges, crossings and barriers.**—Wherever it is necessary to interfere with public or private roads the contractor shall, at his own expense, provide and maintain suitable and safe bridges or other sufficient crossings for the accommodation of the travel on said roads, and shall remove such bridges and other temporary crossing expedients as soon as practicable, and shall restore said roads to as good a condition as before commencing the work. The contractor shall give ample notice to the owners of private roads before interfering with them, and he shall also provide at his own expense watchmen and suitable barriers, fences, and signals, both by day and by night, wherever such may be needed, and take such other precautions as may be necessary for the protection of life and property.

Notice to owners of private roads.

Watchmen, barriers, and signals.

Roadways made at contractor's expense.

14. **Roadways.**—In all places where it is not designed to permanently alter the present conformation of the surface, or where not otherwise specifically directed by the engineer, the contractor will be required to construct and maintain at his own expense suitable roadways upon the acquired right of way and places of deposit for surplus excavation, for the transportation of material, and where use is made of any private roadway or lane for this purpose, the consent of the owners thereof must first be secured by him. Furthermore, in all cases where he may deem it expedient in the performance of his work to construct a roadway in private lands through which the executive board has not acquired an easement, the necessary right of way shall be obtained and the roadway built at his expense. The contractor shall also assume full responsibility for the safety and sufficiency of all bridges and culverts on any public or private roadway which may be used by him in the transportation of materials to and from the works.

Use of private roadways and lands.

Responsibility for bridges and culverts.

Stakes, etc.

15. **Line and grade marks.**—The contractor shall furnish at his own expense all labor, tools, appliances, stakes, forms, spikes, timbers, and materials, other than engineering assistance and instruments, that may be required to enable the engineer to give the necessary lines, grades, and levels for the proper construction of the work. All such marks shall be carefully preserved, and if they are removed through the negligence of the contractor without the consent of the engineer,

Line and grade marks to be preserved.

the expense of replacing them will be charged to him and deducted from the amount due on his final settlement.

Assistance required in making measurements, etc.

16. **Measurements and inspection.**—The contractor shall also furnish, at all reasonable times and without charge, all labor, tools, appliances, and materials of every kind, except engineering assistance and instruments, necessary to enable the engineer to make any inspection, test, or measurement of the work performed, and he shall also convey without charge said engineer and his assistants, or any other employees of the executive board, safely up and down any shaft at all reasonable times and without claim for any necessary delay of the work while such lines, grades or levels are being given, or such inspections, tests, and measurements are being made.

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Access to work.

Clearing surface of trees, etc.

17. **Grubbing and clearing.**—All trees, stumps, brush, logs, walls, boulders and other obstructions shall be cleared from the line of the conduit, where it is built in open trench, and also from the site of any shaft, entrance or overflow chamber or other structure. The width of the clearing will be determined by the engineer in each case, but it shall not extend beyond the limits of any territory controlled by the executive board, except as the privilege of doing so shall first be obtained by the contractor, and at his expense, from the proper parties. The places of deposit for the excavated material shall also be properly cleared to the extent required by the engineer.

Clearing must be done thoroughly.

18. The clearing within the said right of way must be done thoroughly, so as to leave the original surface of the ground in a suitable condition for a roadway, wherever such may be directly practicable, and all stumps of trees and brush must be grubbed out and burned, or removed under the direction of the engineer to localities where the same will cause no inconvenience. Wherever embankments are to be made, the ground must be cleared of all vegetable and perishable matter.

Property of city.

19. Fences, buildings and merchantable timber, stone and wood on the right of way, shall be regarded as the property of the city, and all such material shall be properly removed, piled and stored by the contractor without extra charge.

Replacing fences.

All fences must be replaced at the contractor's cost in a manner satisfactory to the engineer, after the

completion of the work. On previously cleared land, no payment for such removals and replacements will be made, as the amount of such work is believed to be comparatively insignificant.

Payment.

20. The grubbing and clearing will be paid for at the price bid per acre by the contractor in his proposal, but only the surface actually cleared of growing trees and brush will be estimated by the engineer. In localities free from brush, and where less than twenty trees over five inches in diameter at the butt are cut down and removed from an acre of surface, no allowance for grubbing and clearing will be made.

Limit of grubbing and clearing.

General definition.

21. **Excavation.**—Under this term will be included all excavation in trenches, pits, shafts and tunnels, together with all back-filling and embankments that may be needed for the construction of the pipe conduit and its appurtenances, or that may be necessary for the laying, changing and construction of any drain-pipes, culverts, drainage ditches or water-courses, either under or over the proposed conduit, or for any other incidental work that may be ordered by the engineer. It is understood that any excavation which may be necessary for the formation of any roadway required by the contractor, other than as hereinafter specified, must be done at his own expense.

200

Excavation in rock.

22. **Classification of excavated material.**—The removal, handling, refilling and transportation to embankments, or spoil banks, of hard and compact ledge or rock which, in the opinion of the engineer, requires to be loosened by blasting, or of boulders of 20 cubic feet or more in volume, will be estimated as rock excavation.

Excavation in earth.

23. The removal, handling, refilling and transportation to embankments or spoil banks of all earth, loam, clay, sand, gravel, quicksand, mud, muck, hard-pan, stones and boulders of less volume than 20 cubic feet, and all other objects and substance that may be found below the existing surface of the ground in any locality, except rock as above specified, will be classified as earth excavation.

Only two classes of excavation paid for, and conditions.

24. Only the above-mentioned two classes of excavation, rock and earth, will be considered throughout the entire work herein contemplated. The quantity of excavation will be estimated as herein specified, and will be paid for according to the prices bid per cubic yard therefor, under the following different conditions:

(*a.*) In roadway grading, along the axis of the conduit, where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of permanent new channels for water-courses carried over the conduit.

(*b.*) In open trenches or pits for the masonry and pipe conduit, entrance and overflow chambers, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, culverts and other structures.

(*c.*) In shafts connected with tunnel-work for the masonry conduit.

(*d.*) In tunnel-work for the masonry conduit.

What the prices for excavation must include.

25. The prices bid for the excavation of the aforesaid two classes of material, must furthermore include the cost of all necessary labor, tools, appliances, lifting from trenches, hauling through tunnels, hoisting through shafts, refilling in trenches or elsewhere, rehandling, transporting to spoil banks and embankments, and the proper formation of such embankments and spoil banks, provided that the length of the average haul from the place of first deposit on the side of any open trench or excavation, or from the ends of the tunnel, or the top of any shaft, to the place of final disposal does not exceed 1,000 feet measured in the manner hereinafter specified; but when such haul is longer than 1,000 feet as aforesaid, the additional price bid per cubic yard for hauling on the extra length or distance will be paid. No other separate payment for any excavated material put in embankment will be made.

Overhall, how estimated.

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Contractor to examine ground.

26. **Character of ground.**—The character of the material in which the work is to be done must be determined by the contractor from personal examination or judgment. Wherever borings have been made, as shown upon the preliminary maps and plans of the work, much care has been taken to secure accuracy, but it is herewith expressly understood that none of them are warranted to be correct, and that in case the material shall be found to differ from what is thus indicated, the contractor shall have no claim against the executive board on that account.

Accuracy of borings not warranted.

Roadway grading paid for.

27. **Roadway grading.**—Before commencing the construction of the masonry or pipe conduit, in localities where it is contemplated to permanently alter the present conformation of the surface by excavations or embankments, special

directions for the construction of a roadway, suitable for the transportation of material along the right of way and as nearly as practicable over the line or axis of the conduit, will be given by the engineer from time to time. The work involved in such roadway construction must be fully completed before the trenching for the masonry or pipe conduit is commenced in the localities mentioned.

Widths and side slopes of excavations and embankments.

28. In general, where the original surface of the ground is less than three (3) feet above the grade of the invert of the masonry conduit contemplated in route "B" on each side, or is below said grade, such roadway may be formed in embankment not less than thirty (30) feet wide at a level of three (3) feet above said grade on each side; and where the original surface of the ground is more than three (3) feet above said grade on each side, such roadway shall be not less than fourteen (14) feet wide, an approximately level top being provided in both cases. In like manner where the original surface of the ground is less than four (4) feet above the grade of the bottom of the pipe conduit on each side, or is below said grade, such roadway may be formed in embankment not less than sixteen (16) feet wide at a level of four (4) feet above said grade; and where the original surface of the ground is more than ten (10) feet above said grade on each side, such roadway shall be not less than fourteen (14) feet wide, an approximately level top being provided in both cases, as aforesaid.

Slopes of embankments.

29. The slopes of all embankments shall be at least one and one-half ($1\frac{1}{2}$) horizontal to one (1) vertical. In earth excavation, the side slopes shall be at least one (1) horizontal to one (1) vertical, and in rock excavation, the side slopes shall be at least one (1) horizontal to eight (8) vertical. In all cases, the said slopes shall be made as much flatter as the engineer may direct. It is understood that the foregoing refers only to the formation of such roadway wherever specifically required by the engineer.

Slopes of excavations.

Formation of embankments.

202 30. In forming the said embankments, the original surface of the ground shall be thoroughly cleared and all vegetable and perishable matter removed. Where such surface has a considerable slope, it shall be cut to level terraces, as will be directed by the engineer. The material to be used in making the embankments shall be of a loamy or clayey character, carefully selected

Quality of material.

and free from wood, roots, brush, sod, undecomposed vegetable matter and large lumps and stones; said material to be deposited in layers not exceeding eight (8) inches in thickness, and to be thoroughly compacted by heavy rollers, or by the properly directed traffic of the animals, carts and wagons used for transporting the material from the excavations. When the material is so dry as to prevent thorough consolidation, each layer shall be suitably moistened by sprinkling with water after being put in place. All embankments must be finished at least one month before commencing the construction of the masonry conduit in or upon the same, or laying the pipe conduit therein, unless otherwise directed by the engineer.

Consolidation.

Time for completing embankments.

Proper foundation for embankments.

31. Should the original soil in any locality be unsuitable, in the opinion of the engineer, as a foundation for any embankment, the same shall be excavated to such depth as will be directed, and the excavation refilled with satisfactory material, which shall be thoroughly compacted as aforesaid. All surplus earth or other material from the roadway cuttings and other necessary excavations, shall be deposited by the contractor in the embankments by widening the same, or else in spoil banks, at such points within the limits of the right of way acquired, or other territory controlled by the city, as the engineer will direct. On the completion of the work, all of the surfaces shall be neatly formed to true lines and grades in accordance with the directions of the engineer.

Surplus material.

Payment for roadway grading.

32. For the above-described work, payment will be made at the *the* prices bid per cubic yard for excavation in grading the said roadway, measured in place after the surface has been cleared. The cost of making embankments and the aforesaid refilling must be included in the prices bid per cubic yard for earth excavation, except when the material for such embankments must be hauled a distance of more than 1,000 feet, in which case the additional price bid per cubic yard for such extra haul, as hereinafter specified, will be paid.

Overhaul.

Open excavation defined.

33. **Open excavation.**—Open excavation will take place for making the trenches and pits in which any steel or cast-iron pipes and appurtenances of the conduit are to be laid; also in which the entrance and overflow chambers, gate vaults, bridge abutments and piers, railroad

crossings, creek crossings, culverts, and all other structures not in shafts or tunnel, are to be built.

203 34. Open excavations may be either in earth or in rock, in accordance with the above-specified classification, and shall in all cases be made to the lines and grades given by the engineer from time to time, and in general in such manner and to such widths as will give ample room for placing the materials they are to contain, and for all necessary sheeting, shoring, piling, pumping, bailing and draining, also for removing any material which the engineer may deem to be unsuitable for the foundation, even though greater widths of trench or pit than those hereinafter specified in measuring for payment, may, in the contractor's opinion, be required therefor. Said excavations must likewise be maintained in good order and free from water, at the contractor's expense, during the laying of the pipe or the construction of the masonry and the back-filling.

Excavations to be of ample width.

Maintenance.

35. The length and width of trench to be opened, or area of surface to be disturbed at any one time, is to be determined by the engineer. Where the character of the ground will permit, the trenches for large pipes and culverts may be cut for the reception of the invert to the exact line, form and depth required. In case the engineer deems it necessary to excavate to an extra width, or to an extra depth below the normal grade of the bottom of any pit or trench to secure a good foundation, the work shall be done as will be directed, at the price bid per cubic yard for earth excavation; and wherever the sides of the excavation require sheeting and shoring, in order to preserve the limits or form of excavation fixed by the engineer, all such work shall be done and the necessary materials furnished at the expense of the contractor.

Length and area of trench opened.

Extra width and depth ordered by engineer.

Sheeting and bracing.

36. The trench for the pipe conduit shall, in general, be excavated to such depth as to allow of a thickness of covering of not less than three (3) feet between the top or upper surface of said pipe, after being laid, and the existing surface of the ground or the contemplated grade thereof. On the bottom, the trench shall be of such width as may be required by the engineer to insure the proper laying and manipulation of the pipe and the satisfactory back-filling of the same when laid. All bell holes or joint holes must be of sufficient size for the convenient performance of the purpose for which they are excavated. They must be kept

Depth of trench for pipe conduit.

Necessary bottom width.

Joint holes.

Excluding water

dry during the operation of pouring and caulking or bolting and riveting the joints. In general,

Depositing excavated material.

the material excavated must be placed on one side of the trench and at least two (2) feet from the edge thereof, and on the opposite side from that upon which the pipe has been placed.

Special materials.

37. Materials found in the work suitable for any special use are to be reserved for that purpose. In cultivated or arable land, the surface soil covering the location of the conduit trench, shall be carefully removed to a depth of nine (9) inches, and put in spoil banks apart from any other excavated material in such locality, and shall

Restoration of surface soil.

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then be properly replaced upon the top of the refilling of such trench, so as to restore the upper stratum of the ground as nearly as practicable to its original condition, with a slight

Surplus material.

rounding up in the middle. All surplus material, if any, must be of the subsoil or bottom of the excavation. In arable land, the surplus material shall be removed at the contractor's expense to such places as the engineer will direct, subject to the condition for hauling over 1,000 feet hereinafter specified.

Trench to be kept open.

38. Wherever practicable or directed by the engineer, the conduit trench shall be kept clear and open after the pipe has been laid therein until the necessary measurements, inspection and water-pressure tests hereinafter described have been completed. It is understood, however, that pre-

Partial refilling.

vious to said test, a portion of the work of refilling shall, if required, be conducted so as to leave each joint entirely exposed; and at such intervals as the engineer may direct, earth dams not more than two (2) feet high above the top of the pipe, shall be constructed across the trench, so as to prevent any flooding of the whole trench in case of a break;

Bracing.

but at all other points where the material through which the trench is excavated threatens to fall or cave in, the sides shall be properly braced and rendered secure at the contractor's expense.

Limit of side slopes.

39. In measuring all open excavations for payment, the side slopes will all be estimated at one (1) horizontal to ten (10) vertical in rock, and one (1) horizontal to six (6) vertical in earth.

Limit of bottom widths for structures.

40. The size of the said excavations on the bottom will in general be estimated as being one (1) foot wider than the internal diameter of the pipe conduit, or the culvert or drainage pipe, laid therein, or one (1) foot wider and longer than the base of any pier, abutment or detached wall, or

one (1) foot wider and longer than the base of any masonry structure within the walls of which the earth or other material has been excavated to the level of the foundation of said walls. Where a greater width than said amount is required for the foundation of any such wall or structure, the dimensions shown on the plans therefor will be used in computing the volume of the excavation, provided that such dimensions are actually obtained; but where said dimensions are not obtained, and the excavation is not enlarged to the specified dimensions for any reason satisfactory to the engineer, only the actual length and breadth of the excavation will be used for the purpose mentioned.

Normal grade of pipe trenches.

41. For all pipes the normal grade of the bottom of the trenches will, in general, be the line of the lower ends of the vertical external diameters of the barrel of the pipe, as contemplated to be laid by the engineer. In earth excavation, the depth of trench that will be adopted by the engineer in computing the volume of excavation, will be measured from the surface of the ground vertically over the axis of said pipe down to said normal grade line, but in the case of rock excavation, said depth will be measured to a line six (6) inches below said normal grade line.

Measurement of depth in earth and rock.

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Trenches made in roadway.

42. It is also understood that wherever a roadway is intended to be formed over the conduit, all cuttings and embankments contemplated by the engineer for such roadway shall have been made before the excavation of the conduit trench is commenced, and that the surface of the ground just referred to is said roadway surface before being altered by any further excavations or embankments made by the contractor for the work herein specified; furthermore, that where no such roadway over the conduit is intended, the natural or existing surface of the ground will be taken in measuring said depth.

Trenches not in roadway.

Additional excavation for roadway.

43. In cases where the roadway above referred to has not been excavated to sufficient width to permit of the convenient excavation of the conduit trench, the necessary additional width shall be obtained by excavating in the original soil under the specifications and prices governing the formation of said roadway.

Limit of width at axis of conduit.

44. For the masonry conduit, the width of the trench or pit, at the level of the axis or middle of the conduit, will be estimated as being twenty-two

(22) inches greater than the required internal diameter of the masonry at said level in rock, and forty (40) inches greater than said internal diameter at said level in earth; and the excavations for the conduit must in general be made so that not less than the said estimated width at said level shall be actually obtained and be bisected by said axis.

Irregularities of trench

45. Whenever any irregularities in the sides of the trench adjacent to said conduit occur, the same shall be cut away at the contractor's expense sufficiently to afford the required widths on each side of said axis from the bottom up to the level of the top of the backing of the arched roof of the conduit.

Conduit trench in rock.

46. When said conduit is in rock excavation, the bottom of the trench shall be horizontal transversely, and no part of said bottom shall project above the contemplated grade line for the lowest point of the bottom of the conduit on the interior thereof. If the rock is sound, the said bottom of the trench will in general be left unlined with masonry. The cross-section of the conduit may either be horseshoe-shaped, when masonry side walls are required, or it may be trapezoidal with an arched masonry roof, when such side walls are not required by the engineer, as exhibited in diagrams No. 1 and 2, hereto appended. In all cases the faces of the rock excavation shall be made to conform as closely as practicable to the lines on said diagrams showing the limits of excavation for which payment will be made, and so that no portion of said faces will project within said lines.

Lining masonry may be omitted in rock.

Limits of excavation.

Diagrams showing limits of earth excavation.

206 47. Where said conduit is in earth excavation, the bottom of the trench shall be excavated for the reception of the invert masonry to the lines, form and depth exhibited in some one of diagrams No. 3, 4, 5, 6, 7 and 8, hereto appended, and showing the limits of excavation for which payment will be made. In said diagrams the bottom of the trench is shown as being circular, polygonal and horizontal, respectively, and the engineer will direct from time to time, as the work progresses, that the excavation shall be made in conformity with such one of said diagrams as he may deem best adapted to the particular locality.

Choice of cross-sections.

Open trench and tunnel.

48. Whenever it may appear from the prices bid that the said masonry conduit can be constructed in an open trench more economically

than in tunnel, this class of work will be directed, and the excavation shall be made in strict accordance with the plans and directions that will be given by the engineer from time to time.

Excavation partly in earth and rock.

49. In cases where an open excavation of more than two (2) feet in depth is to be made in rock which requires blasting, the removal of the material above the surface of such rock will be estimated on the basis that the earth trench is one (1) foot wider than the width of the rock excavation at the surface thereof, as determined by the above rule for width and side slopes.

Measurement of open excavation in earth and rock.

50. No allowance for earth or rock material excavated beyond the aforesaid limits shall be made, except upon the written order of the engineer obtained before the work is performed; nor will the removal of any material below the normal grades given by the engineer for the bottom of the trenches be paid for unless so ordered. Should such unwarranted excavations be made at any point, the same shall be refilled at the contractor's expense to the proper grade in such manner as the engineer will direct. Furthermore, all slips, slides and caves of the sides of any open trench or excavation will be at said contractor's expense.

Unwarranted excavations.

Slips, slides, and caves.

Permanent new channels for water-courses.

51. Where the construction of a permanent new channel for any natural water-course which is carried under the conduit is required, the excavation shall be made in conformity with the slopes and dimensions given by the engineer in each special case; but no payment will be made for the excavation of any temporary drainage channels constructed by the contractor for facilitating his work on culverts or permanent new channels.

Temporary channels.

Items to be included in prices bid.

52. The prices bid per cubic yard for open excavation, must include the cost of all pumping, bailing and draining, also all packing behind walls, the refilling over and around the masonry and pipe conduit, culverts, railroad crossings, creek crossings, gate vaults, overflows and other structures, and the formation of all required embankments and spoil banks, as will be directed, except when the average haul of the excavated material from the place of first deposit is more than 1,000 feet, in which case the additional price bid per cubic yard for such extra haul, as hereafter specified, will be paid. No other separate payment for any excavated material put in embankment will be made. Furthermore, in estimating the volume of excavation,

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No payment for embankment

Sheeting not estimated.

the space occupied by any necessary sheeting shoring or bracing of the sides will not be considered.

53. **Shaft excavation.**—At such points as the engineer will direct, vertical shafts in general of rectangular cross-section, not less than twelve (12) feet nor more than fourteen (14) feet long, measured along or parallel to the axis of any contemplated tunnel and in clear of all timbering, nor less than eight (8) feet nor more than ten (10) feet wide, measured horizontally at right angles to said axis and in clear of all timbering, may be sunk through the earth, or rock, or both, to the required level of the bottom of such tunnel excavation.

Size of excavation.

Dimensions may be adapted to contractor's plant.

The exact dimensions of said shafts will be fixed by the engineer within the said limits to accommodate the plant of the contractor, and if the contractor should prefer some other form of cross-section than a rectangle, the same may be adopted if approved by the engineer; but in no case shall the estimate for the excavation of such shafts exceed the volume resulting from the adoption of the extreme rectangular limits above specified. It is also understood that where timbering is required for supporting the sides of any shaft, the excavation will be estimated from the area of a rectangle having sides two (2) feet longer than the cross-sectional dimensions in clear of timbering which will ultimately be fixed by the engineer as aforesaid; furthermore, that where timbering is not required for any shaft in rock excavation, the sides must be truly vertical and neatly excavated to the form and dimensions of cross-section given by the engineer.

Measurement of excavation where timbered.

Timbering, machinery and appliances.

54. The contractor shall furnish, put in place and maintain all planks, timbers and other curbing or bracing material that the sides of the shafts may require during the progress of the work; also all materials, machinery and appliances required for hoisting, pumping, draining and ventilation. Proper cages must be used for the hoisting of men and materials at shafts, and every precaution shall be taken to insure perfect safety. The most approved safety catches, of tested efficiency and strength, shall be used in connection with the cages to hold them in case of accident. The cost of all such labor and materials, together with the cost of refilling, must be included in the prices bid per cubic yard for excavating earth and rock in the shafts.

Measurement of shaft excavation.

55. The quantity of excavation will be determined from the measured depths and the sectional dimensions as above specified, provided that such dimensions are actually obtained;
208 but if the actual dimensions are in any case smaller than those above indicated, and are allowed to stand without enlargement, then only the volume actually removed will be estimated. In general, all additional excavation beyond the specified limits will be regarded as made at the contractor's expense, unless ordered by the engineer.

Size of excavation.

56. **Tunnel excavation.**—Where the conduit is constructed in tunnel in earth, the excavation shall be made of such size as to afford sufficient clear room between any necessary timbers for properly building the required masonry lining and backing to the form and dimensions shown on the plans. The cross-section of the conduit may be either circular or horseshoe-shaped, according to the character of the soil, and the excavation will be estimated on the basis that an additional space six (6) inches wide around the entire external surface of the required brick or rubble lining masonry has been removed, as indicated in diagrams Nos. 9, 10 and 11, hereto appended. Any further excavation than this volume that may be required for any reason, will be at the contractor's expense, unless ordered by the engineer; and the cost of furnishing and putting in place all necessary timber, plank, boards, and other supporting materials, and also all required pumping, bailing and draining, must be included in the price bid per cubic yard for tunnel excavation in earth.

Form of cross-section.

Measurement of excavation in earth.

Additional excavation.

Lining masonry may be omitted in rock.

57. Where the tunnel is excavated in ledge rock, the sides and roof may either be lined wholly or in part with brick, rubble or concrete masonry, or may be left entirely without lining, as the engineer may direct. The floor will, in general, be flat and left unlined when formed of sound rock, and the cross-section will be horseshoe-shaped. It is contemplated that the rock excavation shall be made uniform in size and shape throughout, whether lining be required or not, except at such points where the engineer may deem an enlargement of the same necessary for the reception of additional lining masonry; also, that where lining is required by the engineer, the thickness thereof shall ordinarily be eight (8) inches, except as aforesaid.

Excavation to be uniform.

Exception.

Thickness of lining.

Size where lining is not required.

58. Where lining is not required for the sides and roof, the surface of the rock excavation shall be made to conform as closely as practicable to the exterior surface of the horseshoe-shaped conduit, having its side walls and roof eight (8) inches thick, and its floor horizontal transversely and coincident with the contemplated grade line for the lowest point of the bottom of the conduit on the interior thereof, as exhibited in diagram No. 12, hereto appended, and no portion of said rock surfaces shall project within the described lines.

Size where lining is required.

59. The same requirements shall also apply where the said excavation is to be lined with masonry eight (8) inches thick, as exhibited
209 in the appended diagram No. 13. If a lining thicker than eight (8) inches is required by the engineer at any point, the excavation shall be made to conform as closely as practicable to the exterior surface of such lining as exhibited in the drawings which will be furnished by the engineer from time to time as the work advances.

Bottom lining.

It is also understood that the bottom of the excavation may be lined with masonry wherever deemed necessary by the engineer, in which event the excavation shall be deepened sufficiently to permit such lining to be laid, so as to bring its upper surface upon the contemplated grade of the bottom of the conduit.

Measurement of excavation in rock.

60. Where lining is not required by the engineer, payment for rock excavation will be made at the price bid per cubic yard therefor in tunnel, on the basis that the entire volume contained within a line drawn three (3) inches outside of and parallel to the exterior surface of the aforesaid horseshoe-shaped conduit having its side walls and roof eight (8) inches thick, and within the aforesaid horizontal bottom line of the excavation, has been removed, as per said diagram No. 12; and where lining is required by the engineer, the excavation will be estimated on the basis that the entire volume contained within a line drawn six (6) inches outside of and parallel to the exterior surface of the required brick or rubble lining masonry of the sides and roof, whether the same be eight (8) inches or more in thickness, and within the aforesaid horizontal bottom line of the excavation, has been removed, as per said diagram No. 13; and in case that any lining is required by the engineer on the bottom of the tunnel, the excavation will be estimated on the basis that the entire volume contained within the above-

mentioned line around the sides and roof, and within a line drawn three (3) inches outside of and parallel to the exterior surface of the required masonry bottom lining, has been removed, as per diagram No. 14, hereto appended.

Excavation outside of limits.

61. All rock material that may be excavated for any reason by the contractor outside of the said lines, will be at his expense; and wherever any lining is required, the excess of volume thus excavated shall be filled solidly at his expense with concrete, brick or rubble masonry, or such other material as the engineer may direct. The cost of furnishing, putting in place and removing all necessary timber, planks, boards or other supports, and all required pumping, bailing and draining, must be included in the price bid per cubic yard for tunnel excavation in rock.

Refilling.

Cost of timbering.

Limits of tunnel, shaft and open excavation.

62. **General, relating to tunnel, shaft, and open excavations.**—Tunnel excavation will be estimated as beginning at the ends of the open-trench work for the conduit, and ending at the sides of the shaft excavations, the latter not being classed as tunnel. Should any shaft be located on one side of the tunnel, instead of directly over the same, the additional volume of excavation necessary to connect the shaft with the tunnel will be estimated as tunnel-work.

Conformity with lines and grades.

210 63. The utmost care shall be taken by the contractor to make the excavations in all classes of material true to the lines and grades given from time to time by the engineer. Any deviations from said lines and grades shall be corrected at the contractor's expense, and no allowance for any additional excavation or masonry incurred thereby will be made. In soft material of any kind, every precaution shall also be taken to prevent the formation of cavities of any magnitude behind the planking, timbering or other supports; and wherever any such cavities occur, they shall at once be compactly filled by properly ramming in suitable material with tools specially adapted to the purpose. In rock excavation, the drilling and blasting must be conducted with all possible care, so as not to shatter the sides of the trench, shaft or tunnel, outside of the lines determined by the engineer.

Filling of cavities behind timbering.

Care in blasting.

Additional excavations on engineer's order.

64. The engineer may at any time give a written order for additional excavations to be made for chambers and sumps at the bottom of any shaft, or for skewbacks for arches and other purposes in the tunnel and shafts; all additional ex-

cavations thus ordered shall be made by the contractor according to the lines and directions of the engineer, and will be paid for at the prices bid per cubic yard for excavating the same class of material in tunnel or shafts, respectively.

Payment.

Enlargement of excavations on engineer's order.

65. If, after any shaft or tunnel excavation or open trench has been made a certain size by direction of the engineer, he is of opinion that the nature of the rock or other material is such that the form or dimensions of the masonry for which said excavation was intended must be increased, he may give a written order for an enlargement of said excavation for the purpose of increasing said form or dimensions; and the contractor shall make such enlargement, which will be measured according to the lines given by said engineer, and paid for at the prices bid per cubic yard for excavating the same class of material in shaft, tunnel or open excavation, respectively.

Payment.

Responsibility for timbering.

66. The contractor shall be responsible for properly supporting the roof and sides of the tunnel and the sides of the shafts with timber, plank, or other supports; but the timbering, etc., must in all cases be so arranged as to leave ample room for all necessary pipes and appliances required in the prosecution of the work, as well as for the convenient use of the engineering instruments and apparatus needed for giving proper line and grade marks in the tunnel. If the engineer is of opinion that sufficient and proper supports have not been provided, suitable additional supports shall at once be put in place at the contractor's expense, although such action will not relieve or release said contractor from his responsibility for the sufficiency of such supports. The foregoing provisions shall also be applicable to the case of open trenches. All caves or falls of material in the shaft and tunnel work shall be promptly removed, and the spaces properly filled out at the contractor's expense.

Room for pipes, etc.

Additional supports may be ordered by engineer.

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Caves and refilling same.

Removal of timbering. Exception.

67. All timber-work is to be removed from the sides of the shafts and tunnel as the masonry therein advances; but if, in the opinion of the engineer, any timber-work be so located in said sides that its removal would endanger the safety of the masonry, it shall be left in place, and all cavities about it shall be filled solidly with mortar, concrete, masonry, or such other material as the engineer may direct. No payment for any such timber-work will, however, be made to the contractor; nor shall any timbers or braces ex-

Filling cavities.

Cost of timbering.

Removal of braces.

tending across the interior of the conduit or tunnel be left permanently in place under any circumstances.

Power used in tunnel-work.

68. **Power, appliances, and ventilation.**— The power to be employed in driving the tunnel through rock shall be compressed air, or such other agency as may be approved by the engineer, which must be applied by the most approved method. If a shield is used for tunneling in soft ground, hydraulic power may be provided if sufficient force to move the shield cannot be secured by other means. The contractor shall also provide, use and maintain at his expense, appliances for excavating, drilling, blasting, hauling, hoisting and transporting materials, for pumping, lighting or ventilating purposes, and for all other operations connected with the excavation, support and construction of the tunnel and shafts, of such character, number and capacity as will amply secure the rate of progress required. If at any time before the commencement or during the progress of the work, such appliances appear to the engineer to be insufficient or inadequate for securing the quality and quantity of work required, the contractor shall promptly increase their efficiency and number, or improve their character; but the failure of the engineer to demand such increase or improvement shall not relieve the contractor from his obligation to secure the specified rate of progress.

Shield.

Appliances to be furnished and maintained.

Increasing number and efficiency of appliances.

Proper ventilation to be provided.

69. The tunnel and shafts shall at all times be provided with abundant ventilation, and be kept free enough from smoke and noxious gases from explosives, or emanating from the soil or rock, to enable the workmen and inspectors to properly and safely perform their duties. When instrumental work of any kind is to be done in the tunnel or shafts by the engineer or his assistants, due notice will be given to the contractor or his agent, and special care shall be taken to remove completely all smoke and gases in ample season for the proper performance of such work. Should the facilities furnished by the contractor for securing such required ventilation and complete removal of smoke and gases be inadequate at any time, the engineer shall have the right to immediately provide, put in place and maintain all necessary appliances for the purpose at the contractor's expense, the entire cost of the same, if advanced by the executive board, to be deducted from any moneys due or to become

Improvement of ventilating facilities.

Contractor to assist.

due to the contractor on account of the tunnel-work; and it is also expressly understood that whenever the engineer deems it necessary to take such action, no forcible opposition thereto shall be made by the contractor or any of his employees, but on the contrary the latter shall faithfully render such assistance as said engineer may require of them.

Ventilation holes drilled in rock.

70. At such intervals as the engineer may designate, ventilation holes not less than six (6) inches in diameter, shall be drilled through the rock vertically over the axis of the tunnel,

Ventilation pipes driven through earth.

wrought-iron pipes of said diameter being used for passing through the earthy strata from the surface to the rock. The upper ends of such pipes must project about four (4) feet above the surface of the ground, and have a screw-thread cut thereon for the attachment of a suitable iron

Payment for such ventilation holes and pipes.

covering hood. Payment for such ventilation holes as may be ordered by the engineer will be made at the prices bid per lineal foot of iron pipe driven and per lineal foot of drilled hole through rock, the estimated or measured length of the latter to terminate at the roof of the tunnel excavation; and in case that the tunnel is entirely in earth said pipe to terminate at the inner face of the crown of the brick arch.

Facilities for lighting tunnel.

71. The contractor shall provide and maintain during the construction of the work all necessary facilities and appliances for properly and safely lighting the tunnel and shafts where workmen are engaged, or where the engineer and his assist-

Precautions against danger.

ants may be attending to their duties. The utmost care shall be taken to guard against danger from the presence of deleterious, inflammable or explosive gases at all points of the work, and the contractor will be held responsible for all loss,

Cost of lighting.

costs and damages to persons or property resulting therefrom. The cost of said lighting must be included in the prices bid per cubic yard for excavation and masonry.

Precautions.

72. **Blasting and explosives.**—In case blasting is resorted to for making any excavations, suitable precautions must be taken to prevent damage from any fragments of rock which may be

Damages must be paid by contractor.

thrown out. All damages or injury to persons or property, including the pipe and other material furnished by the executive board, resulting from blasting operations, or from neglect in properly guarding the trenches, must be paid by the contractor; and no compensation to said contractor

for losses thus incurred will be allowed. The precautions for the prevention of accident or injury to persons and property are all to be made satisfactory to the engineer, and when such precautions are neglected, said engineer may procure lamps, watchmen, guards and timber for this purpose, and all expenses incurred thereby shall be deducted from any moneys due to the contractor. No compensation will be paid for the use of any or all of these precautions.

Watchmen, lamps and barriers.

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73. The contractor shall also become responsible for all damage or injury to persons and property resulting from the introduction of explosives into the locality of the conduit, and he must provide suitably isolated and safe storage places for all such explosives required in the work; furthermore, only experienced, skillful and trustworthy workmen shall be employed in the handling and use thereof, or have access thereto. Caps and other exploders shall not be stored in the same place in which dynamite or other explosives are stored.

Responsibility for damage from explosives.

74. **Bailing, Draining and Maintaining Excavations.**—The open excavations, shafts and tunnel, must at all times be kept as free as possible from water, and the contractor shall furnish and maintain sufficient pumping appliances to accomplish this end to the engineer's satisfaction. Water from the excavations, or from any pipes, drains, or other water-courses that may be interfered with, shall be conveyed to suitable points of discharge, as may be directed. No water shall be allowed to rise on any masonry, or to flow over the same, until the mortar has attained a proper set, as will be determined by the engineer. All damage, of whatever character resulting from such drainage of the works, or resulting to the works themselves from rain or floods, or from a failure to provide the necessary means for the removal of water from the works at any point, must be paid by the contractor.

Draining open excavations.

Removal of water.

Set of mortar.

Responsibility for damage from water.

75. The entire cost of all labor, material and appliances that may be required in the proper maintenance of all excavations, and the removal or exclusion of water therefrom, must be included in the prices bid per cubic yard for excavation, except in the cases where the pipe conduit may be laid under the channels of Hemlock Lake outlet and Honeoye creek, for which a special price per crossing for all coffer-damming, bailing and draining will be bid and paid.

Cost to be included in prices for excavation.

Exception.

Use of drain-pipe in subtrenches.

76. Where required by the engineer, the proper drainage of the bottom of any open excavation shall be effected by one or more lines of suitable drain-pipe, each laid in a shallow subtrench below the required graded surface of the bottom of the main trench. Said drain-pipe shall be of hard-burned clay, or vitrified earthenware, of the best quality, satisfactory to the engineer in shape and size, sound in all respects, and free from cracks and other defects; they shall also be carefully bedded and laid to proper line and grade, and the joints must be made tight enough to prevent gravel, sand and mud from passing through them. When considered necessary, the joints shall be wound with strips of thin cloth, to serve as a filter in preventing the entrance of earthy matter. The refilling of the subtrenches about the drain-pipe shall be solidly made with selected material and in the best manner, as will be directed.

Quality of pipe.

Manner of laying.

Refilling of subtrenches.

Drain-pipe laid by engineer's order.

214 77. The contractor shall, on receipt of a written order from the engineer, furnish and lay all such drain-pipe which the latter may deem necessary in any locality; and he will be paid therefor at the same rate per lineal foot at which said pipe can be purchased from manufacturers and delivered at said locality by the executive board, with an additional allowance of five (5) cents per lineal foot for all pipe actually laid in accordance with the engineer's directions; such payment to include the cost of excavating and refilling the subtrenches, laying the pipe, winding the joints, board foundation where necessary, and all other labor and materials required in the work.

Payment.

Drainage channels in rock excavations.

78. Wherever, in the opinion of the engineer, special means are necessary for draining the tunnel in rock excavation, a small drainage channel shall be cut in the properly graded floor to such depth, as to free entirely from water those portions of said floor on which any masonry is to be laid. Payment will be made for such drainage channels cut in said rock floor at the rate of ten (10) cents per lineal foot, the written order of the engineer for making said channels to be previously obtained in all cases. Any subsequent enlargement of said channels to dimensions that may be found entirely adequate for the removal of the water as the work advances, as well as the cost of furnishing and laying any drainage tile or pipes in such channels which are to be afterwards removed in localities where no masonry bottom

Payment.

Enlargement of drainage channels.

lining is required, will be at the contractor's expense. In places, however, where the tunnel is to be provided with a masonry invert or bottom, and where such a drainage channel has been excavated and must be kept in use after the completion of said invert, a suitable drain-pipe shall be laid as above described in said channel in accordance with the engineer's direction, and payment will be made therefor at the same rate per lineal foot at which said pipe can be purchased from manufacturers and delivered at said locality by the executive board; but it is understood that the diameter of such pipe shall not exceed ten (10) inches in any case, and that payment for the excavation in earth of the required trench for said pipe, along with the proper laying of the same therein, will be made at the rate of five (5) cents per lineal foot.

Use of pipes in drainage channels.

Payment.

79. The contractor shall be held responsible for the sufficiency of all the aforesaid drain-pipe in the tunnel, and it is expected that he will arrange his pumping appliances in such manner as to render the use of pipes larger than (10) ten inches in diameter unnecessary; but if, for any reason, it should be found necessary to use anywhere such larger pipes in order to remove the water and protect the masonry to the engineer's satisfaction, the contractor shall provide them, and the additional cost thereof, beyond that of said ten (10) inch pipe, must be included in the prices bid for excavation. At suitable intervals, openings shall be made into said drain-pipe, and in the masonry invert of the tunnel, for admitting the drainage water, said openings to be properly protected during the progress of the work, and to be solidly filled to the bottom of the pipe with concrete and mortar on its completion. Where required by the engineer, the said drain-pipe shall be laid with cemented joints in the best manner, and without additional compensation beyond the prices above named.

Responsibility for sufficiency of drain pipes.

Enlargement of drain-pipes.

Openings into drain-pipes.

Closing of same.

Pipes laid with cemented joints.

80. **Embankments and spoil banks.**—Wherever the volume of material excavated, whether from tunnel workings and shafts, or from trenches, pits, or other open excavations, is in excess of that required for back-filling, such excess shall at once be removed from the site of the excavation, and be properly deposited in embankments on the line of the conduit, or in spoil banks at more or less distance from said line, and within the limits of the right of way acquired, or other territory

Removal of surplus material.

Spoil banks.

controlled by the city, in accordance with the directions of the engineer. The spoil banks thus made shall conform closely to the dimensions and grades given by the said engineer, and the surfaces must at all times be kept properly trimmed and graded.

Embankment over masonry conduit.

81. When the grade for the bottom of the trench for the masonry conduit is less than eleven (11) feet deep below the original surface of the ground, or the surface of the roadway above described, said conduit shall be surrounded and covered with an embankment of carefully selected material of a loamy or clayey character, which must be free from wood, roots, brush, sod, undecomposed vegetable matter and large lumps, stones or pebbles. The materials must also be loose and in such condition as to admit of being thoroughly compacted by suitable rollers, by pounding, or by the properly directed traffic of the animals, carts and wagons used for transporting it from the place of excavation. It shall be deposited evenly on both sides of the conduit, in layers not more than six (6) inches thick, and of such width on each side as may be necessary to form a durable and impervious embankment, having slopes of not less than one and one-half ($1\frac{1}{2}$) horizontal to one (1) vertical, and a horizontal top width of at least nine (9) feet at a level three and one-half ($3\frac{1}{2}$) feet above the crown of the masonry arch, it being understood that said top width is exactly bisected by the center line of the conduit.

Character of materials.

Deposited in layers.

Width and side slopes.

Consolidation.

82. The layers shall be thoroughly consolidated by moistening, rolling or pounding, or by the traffic over the same as heretofore described, and as the engineer may direct, special care being taken in the performance of the work next to the exterior of the masonry, and for a distance of several feet beyond. The embankments must be finished before the centering of the masonry arch is removed, and during the progress of the work the side walls of the conduit must be securely braced to prevent deformation from undue and unbalanced pressures. On the completion of the work, the top and side slopes of all such embankments shall be neatly formed to true lines and surfaces, upon which any surplus rock material may afterwards be deposited to such thickness as the engineer may direct.

Completed before removing centering.

Shaping top and sides.

Embankment over pipe conduit.

83. When the grade of the bottom of the trench for the pipe conduit is less than six (6) feet deep below the original surface of the ground, or the

surface of the roadway above described, the conduit shall be surrounded and covered with an embankment of material selected and put in place as above described. Said embankment shall have a horizontal top width of at least six (6) feet at a level three (3) feet above the top of the pipe, it being understood that said width is exactly bisected by the center line of the conduit. The said width may also be increased to nine (9) feet or more wherever the engineer will direct.

Embankment around structures.

84. Where the surface of the ground around any structure is to be raised by embankment, the work shall in general be done as above specified for filling over the conduit, except that above the highest water level somewhat coarser materials may be used, and the dimensions of the embankment varied in accordance with the directions of the engineer.

Payment.

85. The cost of making said embankments, as well as all spoil banks, must be included in the prices bid per cubic yard for excavation, except when the material for such embankments must be hauled an average distance of more than 1,000 feet, in which case the additional price bid per cubic yard for such extra haul, as below specified, will be paid.

Estimating distance.

86. **Overhaul.**—In general the intention is to make the haul for the removal of any excavated material as short as practicable. In estimating the distance hauled, it is understood that in the case of open excavation, the starting points will be the centers of gravity of cuttings from which material is to be hauled away; and in the case of shaft and tunnel work, the starting points will be the tops of the shafts or the ends of the tunnel; also that the terminal points will be the centers of gravity of such nearest embankments or spoil banks as will be directed to be made by the engineer; and that the distance between said starting and terminal points will always be measured in a direct line. When the length of such haul as above defined is more than one thousand (1,000) feet, the price bid per cubic yard for each additional one hundred (100) feet hauled, or fraction thereof greater than fifty (50) feet, will be paid.

Payment.

Refilling trenches.

87. **Back-filling in open excavations.**—As soon as possible after any pipes for culverts, or for the conduit and its appurtenances have been laid, inspected, measured, tested and made tight in the trench, as hereinafter provided, the work of refilling said trench shall be commenced and prose-

cuted energetically, so as to avoid damage
217 by caving or otherwise. In this operation
Quality of material. only the finest selected earth material shall be deposited under and around the pipes and specials to at least one-half the depth of the pipe, and
Manner of doing work. said material shall be thoroughly pounded or rammed with proper tools as it is being thrown in, particularly under and around the haunches of the pipe, so as to fill the lower portion of the trench compactly throughout, and give said pipe a solid bearing for its entire length. The material must not be thrown down from above faster than the workmen can properly distribute and
Precautions. compact it. Great care must be taken not to injure the coating of the conduit pipe during the back-filling, and whenever the said coating is injured, accidently or otherwise, the pipe at such
Painting pipes. place must immediately, and before the back-filling is continued, be painted as hereinafter specified.

Settling trenches by flooding. 88. In case the refilling of any portion of the trench is allowed to be settled by flooding with water, from the pipe already laid or from any other source, the first flooding shall be done when the trench has been back-filled to about half the depth of the pipe, in order to insure a thorough settlement of the earth under the haunches
Manner of applying water. thereof. Care must be taken to avoid using an excess of water by which the material would be rendered too soft, or of the consistency of mud; and the water must be applied only in such manner as to prevent any tendency of the pipe to rise by flotation in depressions or elsewhere. No
Engineer's directions. flooding of the trench shall be done without the explicit consent of the engineer, and all directions given by him in such cases shall be carefully observed. All water, tools and appliances for such flooding must be furnished by the contractor at his own expense.

Refilling upper portion of trenches. 89. The material for back-filling around and over the upper half of the pipe may be somewhat coarser than that which is used under the lower half, but must still be selected, so that no hard lumps, stones or pebbles larger than four (4) inches in diameter, will occur therein, and the same shall be thoroughly consolidated by ram-
Consolidation of material. ming or pounding until the pipe has been covered to a depth of six (6) inches. Above this level any material from the excavations may be used for back-filling, except large lumps, stones or frag-
Case of rock material. ments of rock weighing 25 lbs. or more. Where a considerable quantity of fragments of rock is to

be used in refilling the upper portion of the trench, the same shall be deposited in thin layers alternating with layers of earthy material as will be directed. In cultivated land, the top layer of surface soil, to a depth of nine (9) inches, shall always be neatly replaced, as aforesaid. Whenever any back-filling is done during frost, special care shall be taken to prevent placing any large lumps or frozen material in any trench, and in general, no such work shall be undertaken from the fifteenth day of November until the first day of April, without the explicit consent of the engineer; this provision shall also be applicable to all other excavations.

Replacing surface soil.

Work during frost.

218 90. The excavations behind the walls of all masonry structures shall be thoroughly back-filled and tightly packed with the best of the excavated earth material as said walls are being carried up. No stones or pebbles shall be used for this purpose below the frost line, and the work must be done according to the directions of the engineer, the intention being to have all spaces behind said walls compactly filled out with a relatively impervious earth, and without causing any injury to the masonry.

Back-filling for walls.

91. Similar earth material shall be used for refilling the remainder of the trench, or for making an embankment over any masonry conduit, culvert or other structure, after the completion of the masonry and pipe work, until a depth of at least two (2) feet above the top of the pipe or the crown of the masonry arch has been attained. All such material must be carefully selected and be spread in layers not exceeding six (6) inches in thickness, each of which shall be thoroughly compacted and adjusted to the sides of the trench, or the continuation of the embankment, by ramming or pounding while in a moist condition, and in case said material is too dry to admit of such thorough consolidation, it shall be suitably moistened by sprinkling. The material must not be deposited faster than the workmen can properly distribute and compact it, nor shall it be drenched with water so as to render it of the consistency of mud.

Material for embankments over conduit and culverts.

Consolidation of material.

Excess of water.

92. Where plank sheeting has been used to support the sides of the excavation for a culvert or masonry structure, the same shall be carefully removed in such a manner as to prevent any caving. While the sheeting planks are being withdrawn, the vacancies left by them shall be thoroughly filled by ramming in fine material

Sheeting.

Removal of sheeting.

with tools specially adapted to the purpose. In places, however, where the engineer is of the opinion that the sheeting cannot be removed without injury to the work, he will give written directions that it shall be left in place, and the contractor will be paid for the lumber thus left, up to a thickness of two (2) inches, at the rate of fourteen (14) dollars per thousand feet B. M.

Payment for sheeting left in place.

Cost of back-filling included in prices for excavation.

93. The cost of all said work of back-filling the trenches for the conduit and its appurtenances, and refilling and embanking at culverts and masonry structures, must be included in the prices bid for excavation.

Time for completing embankments.

All culverts and embankments shall be fully completed at least one month, or such longer time as may be directed, before the construction of the conduit over the same; and if required by the engineer, all such embankments shall previously be thoroughly wetted and allowed to settle at the contractor's expense.

Filling cavities behind planking.

94. **Back-filling in tunnel and shafts.**—In the tunnel and shafts, all spaces or cavities behind any planking or timbering of the roof or sides of the excavation must be compactly filled by ramming in suitable dry material with tools specially adapted to the purpose.

Filling space behind lining masonry.

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95. The spaces between the exterior surface of the brick or other lining masonry, and the rock or other material of any tunnel excavation, or any timbering or supports for the roof or sides of such tunnel which it may be necessary to leave in place, shall be solidly filled as follows: From the bottom of the excavation up to a level of thirty-three (33) inches above the center or middle of the conduit, all of said spaces shall be compactly filled with concrete or rubble masonry, which will not be regarded as any portion of the lining masonry, while the remainder of said spaces, above said level and outside of the arched roof, shall be filled with dry material consisting of tunnel refuse, gravel, or other material approved by the engineer, as indicated in the appended diagrams No. 9, 10, 11, 13 and 14. Both the concrete and the dry filling material must be thoroughly compacted by ramming or pounding with suitable tools into a solid mass.

Concrete or rubble filling.

Dry filling material.

Consolidation of filling.

Payment for masonry filling.

96. The cost of all such dry filling in tunnel work must be included in the prices bid per cubic yard for excavation in tunnel, as aforesaid. For the said concrete or rubble masonry filling, payment will be made at the prices bid per cubic

yard therefor, on the basis that downwards from said level of thirty-three (33) inches above the center or middle of the conduit, the volume contained between the exterior surface of the required lining masonry, and the above-described lines defining the limits of estimated excavation, as exhibited in said diagrams No. 9, 10, 11, 13 and 14, respectively, has been properly filled with such material as aforesaid. All spaces outside of said limits shall be filled in the manner and with the materials above described at the contractor's expense.

Diagrams exhibiting limits.

97. The shafts shall be refilled over or around the masonry constructed therein, with earth material of approved quality from the excavations, such material to be carefully lowered to place in suitable buckets where the depth is more than fifteen (15) feet. Said filling shall be made as the masonry is being carried up, and be thoroughly compacted by ramming in layers of not over six (6) inches in thickness for the entire height; and when the material is too dry to admit of thorough consolidation, it shall be suitably moistened as aforesaid. The cost of all such refilling of the shafts must be included in the prices bid per cubic yard for the excavation of shafts.

Refilling of shafts.

98. Special care shall be taken in the back-filling of the tunnel and shaft masonry, as well as in the back-filling of the conduit in open cuttings, to insure thorough filling of all cavities without causing any deformation of the lining masonry, and all defects which may be discovered at any time after the removal of the centering shall promptly be remedied by the contractor, or by the engineer at the contractor's expense.

Precautions in back-filling.

220 99. **Cements.**—All cement used in the work, for the purposes hereinafter specified, will be subjected by the engineer to rigorous tests, and if found of improper quality at any time, it will be rejected. As far as its general character and tensile strength is concerned, the quality of natural and Portland cements furnished by the contractor will be judged by the following-described tests and conditions:

Tests.

100. The American natural cement must be freshly burned, and be equal in quality to the best brands of Buffalo, Rosendale or Improved Union cements. It shall be ground so fine that at least 92 per cent. in weight will pass through a standard sieve of 2,500 meshes to the square inch, and shall be free from excess of lime, as determined

Natural cement.

Fineness.

by the usual tests for "blowing." When tested neat, it shall have, at the end of twenty-four hours, a tensile strength of at least 50 pounds per square inch, after the exposure of the briquettes in air for one hour or until set, and for the remainder of the twenty-four hours in water of about 60 degrees F.; and when exposed for one day in air and six days in water, as aforesaid, it shall attain a tensile strength of at least 100 lbs. per square inch.

Tensile strength.

Portland cement.

101. The American or foreign Portland cement used shall be ground to a greater degree of fineness than above specified for natural cements, and shall also be free from excess of lime. When tested neat, it shall have, at the end of twenty-four hours, a tensile strength of at least 100 lbs. per square inch, after exposure of the briquettes in air for one hour, or until set, and in water of about 60 degrees F. for the remainder of the twenty-four hours; and when exposed for one day in air and six days in water, it shall attain a tensile strength of at least 350 lbs. per square inch.

Fineness.

Tensile strength.

Protection from moisture.

102. The cements must at all times be kept thoroughly protected from the weather, and all such as may have become injured by dampness or moisture will be rejected. Portland cement must be delivered at the site of the conduit at least one month before it is required for use, and shall, if required by the engineer, be spread out and exposed to the air under close shelter in layers not more than six (6) inches thick, for at least two weeks before being used. Samples for tests will be taken by the engineer as frequently as he may deem expedient, and no charge for the material thus taken shall be made by the contractor. Each sample to be sufficient in quantity for making at least five standard briquettes of one square inch sectional area.

Delivery.

Samples for testing.

Quality of sand.

103. **Sand for mortar.**—The sand to be used in making mortar shall be clean, sharp and free from any appreciable admixture of dust, dirt, earth, clay, loam or vegetable mould. Any sand containing in the aggregate more than seven per cent of its volume of such impurities will be rejected, or else it must be freed therefrom by washing. For stone-work and brick-work, the sand shall also be of such grain that at least 70 per cent. of its volume will pass through a sieve of 400 meshes per square inch and be retained upon one of 1,600 meshes per square inch; and if it contains pebbles in con-

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Size of grain.

siderable quantity, the same shall be removed by proper screening. For concrete, the sand need not be screened, if otherwise of a quality satisfactory to the engineer. Sand for concrete.

104. **Mortar.**—All mortar shall be prepared from cement in perfect condition, and from clean sand, as aforesaid, thoroughly mixed together dry in the following proportions by volume or measure: Mortar.

(*I*)—*Natural cement mortar:*

(*a.*) For pointing, 1 part of sand to 1 part of cement.

(*b.*) For brick masonry, 1½ parts of sand to 1 part of cement.

(*c.*) For stone masonry, 2 parts of sand to 1 part of cement.

(*II*)—*Portland cement mortar:*

(*d.*) For pointing, 1½ parts of sand to 1 part of cement.

(*e.*) For brick masonry, 2 parts of sand to 1 part of cement.

(*f.*) For stone masonry, 2½ parts of sand to 1 part of cement.

105. Should the sand be of inferior quality in any respect, the engineer shall have the right to reduce the proportion of such sand in the preparation of mortar without claim for extra compensation on the part of the contractor. The mixing of the sand and cement must always be done upon a suitable plank or stone platform, and in no case directly upon the ground. After such dry mixing, clean, fresh water, shall be added in sufficient quantity to produce a paste of proper consistency, the whole to be thoroughly worked with hoes or other tools. All excess of water must be carefully avoided. The mortar must be freshly mixed in comparatively small quantities for the work in hand, and no mortar shall be used which has been tempered long enough to have acquired an appreciable set, as the retempering thereof will not be allowed. Furthermore the mortar shall always be deposited upon and taken from suitable plank or board platforms. Inferior sand. Mixing on platforms. Water. Fresh mixing. Plank platforms.

106. **Masonry.**—The contractor will be required to furnish the materials for and construct all masonry that may be required for any masonry conduit, shafts, tunnel, manholes, and entrance and overflow chambers; at the several railroad and creek crossings; at places where water-courses are to be permanently carried over the conduit, and also wherever suitable culverts for carrying Where masonry is required.

water-courses under the conduit do not already exist; at all places where special foundations or supports for stop-gates and special castings or pieces in the pipe conduit and its appurtenances are required; and in general, at all other places where masonry may be required by the engineer for the proper completion of the work contemplated. All masonry will be built according to the plans furnished and instructions given by the engineer, and will be estimated and paid for by the cubic yard, computing only the volume thereof as herein specified. Masonry will be classified as follows: Concrete; brick masonry, first-class, or cut dimension stone-work; second-class stone masonry; third-class stone masonry; fourth-class or common rubble masonry; slope-walls; paving; riprap.

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Classification.

Concrete, where used.

107. **Concrete masonry.**—Concrete masonry may be used for the foundations and backing of the walls of the entrance and overflow chambers, conduit, culverts and other structures built in open excavations; for filling the space between the sides of the excavation and the exterior of the masonry lining of the tunnel and shafts; and it may also be used as a substitute for stone or brick masonry in any portion of the entire work where such a substitution may be deemed expedient by the engineer.

Substitute for other masonry.

Classes of concrete

108. The concrete masonry will be made with natural cement or Portland cement, in the manner hereinafter specified, and when used by direction of the engineer, will be divided into the following classes, and payment for the estimated quantities of such masonry in each class will be made according to the prices bid per cubic yard for such class and quality:

(*a.*) All concrete masonry made with natural cement and used in the foundations, backing and walls of the masonry and pipe conduit, entrance and overflow chambers, culverts and other structures built in open excavations.

(*b.*) All concrete masonry made with Portland cement and used in the foundations, backing and walls of the masonry and pipe conduit, entrance and overflow chambers, culverts and other structures built in open excavations.

(*c.*) All concrete masonry made with natural cement and used in the foundations and backing of any lining masonry built in the tunnel and shafts.

(*d.*) All concrete masonry made with Portland

cement and used in the foundations and backing of any lining masonry built in the tunnel and shafts.

Ballast material.

109. The ballast material for concrete shall consist of clean gravel, or fragments of hard and durable stone or brick, broken to such size as will pass freely in largest dimensions through a two (2) inch ring, or a mixture of said materials. The gravel stones must also be capable of passing through said ring, but all sand and pebbles smaller than one-fourth (¼) inch in diameter shall be screened out. All of this material shall be free from dirt, earth, clay, and other improper substances, and when necessary or required by the engineer, it shall be washed before being mixed with cement or mortar.

Cleaning.

223 110. To form the concrete, the following proportions in units of volume of the component materials, shall be adopted:—One (1) part natural cement, two (2) parts sand, and five (5) parts ballast; or if Portland cement is used, one (1) part Portland cement, three (3) parts sand, and seven (7) parts ballast; the quality of said materials to be as above described. The sand and cement shall first be properly mixed together dry and formed into mortar, whereupon the ballast shall quickly be added and thoroughly mixed with said mortar in an approved machine, or by repeatedly turning over with shovels upon a suitable plank platform. As soon as the mixing is completed, the concrete must be deposited rapidly in layers in the place where it is required, and be thoroughly pounded or rammed in a manner satisfactory to the engineer until the water flushes to the surface, and all the interstices between the stones or pebbles are entirely filled with mortar. Should voids be discovered when the forms are taken down, or otherwise, the defective work is to be removed and the space refilled with suitable material in a proper manner at the contractor's expense.

Proportions.

Mixing.

Depositing in place and ramming.

Defective work.

111. The concrete shall be allowed to set for a sufficient time after being deposited in place as aforesaid, before walking over or working upon its surface is permitted. The time thus required will be determined by the engineer. Where forms are required to hold the concrete in place they shall be furnished at the contractor's expense, and set true to the lines designated, and shall be firmly secured until the material has hardened.

Time for setting.

Forms.

112. When concrete is deposited against the

Sheeting to be left in place.

Payment for sheeting left.

Measurement.

Unnecessary excavations to be filled.

Smaller excavations than required.

plank sheeting of the conduit trench or other open excavation, at any point, such sheeting must be left in place for the depth thereof thus covered, and the same will be paid for, up to said height and for a thickness of not more than two (2) inches, at the rate of fourteen (14) dollars per thousand feet B. M. The quantity of concrete to be paid for will be determined by measurements or estimates of the number of cubic yards of such material deposited in place in conformity with the aforesaid diagrams or other plans and directions of the engineer. When the said excavations are made wider or deeper than called for by said diagrams, plans and directions, the extra volume thus excavated shall be completely filled out at the contractor's expense with concrete, wherever the use of such material was contemplated for foundation or backing purposes, except in cases where, in the opinion of the engineer, the unauthorized extra depth may safely be refilled to the required grade with other material. In cases, however, where the width or depth of the excavation is appreciably less than the dimensions required by said plans and directions, and where the engineer has given his explicit consent to the maintenance of such smaller dimensions, only the actual volume of concrete put in place, as determined by measurement or estimate, will be paid for.

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Brick-work, where used.

113. **Brick masonry.**—Brick masonry may be used for the foundations, lining and walls of the entrance and overflow chambers, the inside lining of the masonry conduit, culverts and other structures built in open excavations and for the lining of the tunnel and shafts; and it may also be used as a substitute for stone or concrete masonry in any portion of the entire work where such a substitution may be deemed expedient by the engineer.

Classes of brick-work.

114. The brick masonry will be laid with natural or Portland cement mortar in the manner hereafter specified, and when used by direction of the engineer, will be divided into the following classes, and payment for the estimated quantities of such masonry in each class, will be made according to the prices bid per cubic yard for such class.

(*a.*) All brick masonry laid with natural cement mortar, in the entrance and overflow chambers, masonry conduit, manholes, culverts and minor structures built in open excavations.

(*b.*) All brick masonry laid with Portland cement mortar, in the entrance and overflow chambers, masonry conduit, manholes, culverts and minor structures built in open excavations.

(*c.*) All brick masonry laid with natural cement mortar, built in the tunnel and shafts.

(*d.*) All brick masonry laid with Portland cement mortar, built in the tunnel and shafts.

Quality of brick.

115. The brick to be used in the work shall be of best quality, new, whole, sound, compact, burned hard entirely throughout, free from injurious cracks, and with true and even faces and edges. They shall be culled by capable men, furnished by the contractor, as they are delivered upon the work, and all that are badly broken or very defective shall at once be broken up for use in concrete, or else removed from the locality. Hard-burned bricks, less perfect than those required for the conduit or for face-work in walls, and a small proportion of bats, which may be satisfactory to the engineer, may be used in the outer rings of manholes and in the core of walls more than two feet thick. The brick must have a crushing strength of not less than 4,000 lbs. per square inch in any direction.

Crushing strength.

Brick to be wetted.

116. The bricks shall be thoroughly wet just before laying, and the mortar shall be of the quality above described. They shall be laid to a line, with the beds in the line of the radii of the curves, and with as close joints, not exceeding one fourth ($\frac{1}{4}$) inch for face-work, as may be directed from time to time. Every brick shall be completely imbedded in mortar at its bottom, side and end, at one operation. In no case shall any joint be made by working mortar into the same after the brick has been laid; nor shall any portion of the brick-work be laid dry and afterwards grouted. In the side walls and invert of the conduit, where the cross-section is not a circle, the bricks must be laid with the English bond, one header course alternating with not more than four stretcher courses, and with a header course at the top and bottom of said walls. In semi-circular arches having a smaller radius than five (5) feet, the bricks shall be laid in concentric rings, each longitudinal line of bricks breaking joints with the adjoining lines in the same ring and in the ring underneath; the thickness of the mortar joints between such rings to be not more than three-eighths ($\frac{3}{8}$) inch. These provisions shall also be applicable to all culverts,

Manner of laying.

Inside walls and invert of conduit.

In large arches.

Provisions applicable to other structures.

manholes, shafts or circular openings in foundation walls, which it may be designed to construct of brick-work.

Groining.

117. All intersections of manholes and shafts with the conduit shall be neatly groined in the best and most workmanlike manner, and particular attention shall be given to the proper keying of the tunnel arches. At all places where there is a change in the shape of the masonry, as well as at all curves, angles, shafts, chambers, etc., the masonry shall be built carefully to the required forms and lines; and where the section of the conduit is horseshoe-shaped, with a brick invert, specially moulded skewback bricks shall be used at the junction of said invert with the side walls. Care shall be taken to have all the interior surfaces smooth, true and regular, and the same shall also apply to all exterior surfaces of structures which are to remain permanently exposed to view. The interior surface of the conduit shall be rendered smooth by scraping off all projecting mortar within two days after removing the centering, and by carefully pointing the joints where required. Only thoroughly experienced and skillful mechanics shall be employed on the work.

Keying of arches.

Changes of form.

Skewback bricks.

Surfaces to be smooth.

Cleaning and pointing.

Manner of laying brick in structures.

118. The brick-work in the foundation and other walls of all structures pertaining to the conduit, shall be laid with the English bond, one header course alternating with not more than three stretcher courses, and in such manner as to make the bricks in each course break joints with those of the courses above and below, by overlapping to the extent of from one-fourth to one-half the length of a brick. The mortar joints shall in general be one-fourth ($\frac{1}{4}$) inch thick, and shall not exceed three-eighths ($\frac{3}{8}$) inch in thickness in any place. Special care must be taken to secure the strongest kind of bond at all angles and corners.

Mortar joints.

Unfinished brick-work.

119. All unfinished brick-work must be properly "racked back" or "toothed," as directed, and when new work is joined to it, the surface of the bricks previously laid must be scraped and thoroughly cleaned by scrubbing with a stiff brush, and be well moistened just before fresh mortar is applied thereto. The construction of the masonry in the conduit and tunnel must progress simultaneously with the work of excavations unless otherwise permitted.

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Progress of work.

Cleaning and plastering backing masonry.

120. The whole interior face of the rubble or concrete backing or foundation, against which the brick lining of the invert, the brick side walls of the conduit, or the brick walls of any structure thereto pertaining are to rest, shall be thoroughly cleaned and then plastered over with a coating, at least three-eighths ($\frac{3}{8}$) inch thick, of the same kind of mortar as above specified for brick-work. In case that concrete backing for the side walls of the conduit is used and put in place while such walls are being built, the rear face of the brick-work shall be plastered over thickly with said mortar, after which the concrete may be deposited and rammed, care being taken to completely fill out all interstices between said walls and the side of the trench or sheeting, also to securely brace the brick-work to prevent any deformation thereof.

Filling interstices in work.

Plastering exterior of conduit arch.

121. The entire extrados of the upper arch of the conduit, above the springing line thereof, where built of brick in open excavations, shall also be carefully cleaned and plastered over, at the contractor's cost, with a coating of mortar at least one-half ($\frac{1}{2}$) inch thick, to be applied before the backing is put in place, and to be kept from injury during the latter operation, or to be thoroughly repaired if injured. This provision shall also apply to the case of the exterior surfaces of all manholes and arches in shafts, culverts, or elsewhere.

Applicable to manholes, etc.

Quality.

122. **Cut-stone masonry and copings.**—The stones which are to be cut to specific dimensions for overflows, sills and wall copings, shall be sound, durable and of such quality as will be approved by the engineer. In general these stones will be from four (4) to eight (8) inches thick, of large size, with smoothly dressed or cut faces, ends and sides, and with beds adapted for laying on a bed of mortar not more than one-half ($\frac{1}{2}$) inch thick. In the joints the mortar shall not be more than three-eighths ($\frac{3}{8}$) inch thick at any point for the entire depth of the stone, and all spaces between said stones must be thoroughly filled out with mortar. If required, the mortar in the joints shall be driven into place with suitable caulking tools. In all face-work, the joints shall be raked out to a depth of at least one (1) inch, and then properly pointed with Portland cement mortar of the quality above specified.

Thickness.

Mortar joint.

Pointing.

Defacement.

123. The stones must not be disfigured or injured in any manner in handling, and all addi-

Adjustment.

tional cutting or dressing necessary to make them fit truly to the required lines and surfaces of the work shall be done by the contractor without extra compensation.

124. **Second-class stone masonry.**—This class of work may be used for the portions of bridge abutments, wings and piers which

Where used.

227 are above ground, and where directed it may also be used for retaining walls. The

Face stones.

face stones shall be rock-faced, with edges pitched to straight lines, no projections exceeding (3) three inches beyond said lines, parallel beds and

Manner of laying.

rectangular joints; they shall be laid on their natural beds as headers and stretchers, in regular horizontal courses, not less than eight (8) nor more than twenty (20) inches in thickness, the latter decreasing regularly from the bottom to the top of the walls when the courses are not uni-

Size of stones.

form. Stretchers shall be not less than two and one-half ($2\frac{1}{2}$) feet nor more than six (6) feet in length, and not less than eighteen (18) inches in width, nor less in width than one and one-fourth times their thickness when the same is more than fourteen (14) inches. Headers must not be less than three and one-half ($3\frac{1}{2}$) feet in length, where the thickness of the wall will admit of the same, and not less than eighteen (18) inches in width, nor less in width than they are thick, provided that their thickness exceeds eighteen (18) inches, and must hold the same size in the heart of the

Dressing beds and sides.

wall as shown on the face. The beds and sides of the face stones shall be pointed, cut or hammered before being placed on the work, so as to form joints not exceeding one-half ($\frac{1}{2}$) inch in width for a distance of fifteen (15) inches back from the face on the beds and eight (8) inches back on the sides; the remainder of said beds to be well dressed parallel and true to the proper line, and made always as large as the stone will

Chisel draft at angles.

admit. A neat chisel draft one (1) inch wide shall be cut on each side of every angle in the face-work. The headers and stretchers shall be placed so as to alternate with those in contiguous courses, and so that at least one-fourth of the masonry shall consist of headers extending entirely through

Laying and bonding.

the wall; the stones of each course shall also be arranged to form a proper bond or break joints at least twelve (12) inches with the stones of the contiguous courses, and must be laid flush in the cement mortar elsewhere specified for stone ma-

sonry. If any inequalities occur in the beds or joints, they must be carefully pointed off before the stones are finally set. After the completion of the masonry, all joints in the face-work shall be properly raked out and cleaned to a depth of at least one (1) inch, and then neatly pointed up in the best manner with the mortar specified for the purpose.

Inequalities in beds and joints.

Pointing.

125. The backing shall consist of large, well-shaped stone, laid in full beds of mortar with joints well broken, and so disposed as to thoroughly bond the work in all directions, and leave no space between them over six (6) inches wide; all such spaces to be filled with small stone packed in mortar. Every stone must be properly cleaned and moistened before being laid in the work. Each course shall also be thoroughly grouted before the next is laid, if required by the engineer. No hammering will be allowed on any stone after being placed in the work, and any stone loosened in any manner after the mortar is set, must be taken up and relaid in fresh mortar.

Backing masonry.

Grouting.

Relaying loose stones.

228 126. All foundation masonry or courses below the surface of the ground will involve much less labor in the dressing and fitting of the stones, and will be paid for as third-class work. All bridge seats and tops of walls will be finished with a coping course of such dimensions and projection as may be ordered by the engineer, and will be paid for as first-class work. The price bid per cubic yard of the above-described second-class stone masonry will be understood as covering all material and labor.

Foundation courses.

Copings.

Payment.

127. **Third-class stone masonry.**—This class of work may be used for the foundations of abutments, piers and retaining walls below the surface of the ground, and, when directed by the engineer, for similar structures above ground; also for large culverts, railroad crossings and elsewhere as may be directed. For the foundation courses of second-class work, selected, large and flat stones, at least ten (10) inches thick, and having not less than ten (10) square feet of bed surface, must be used; for the foundation courses of third-class work, the largest and best stones shall in all cases be used. The remainder of the foundation below the surface of the ground need not be arranged in regular courses, but the stones must all be of good size, not less than six (6) inches thick, twelve (12) inches wide, and thirty (30) inches long, laid on their flat, natural beds, roughly squared or

Where used.

Foundation courses.

Size of stones.

Dressing beds and sides.

trimmed on the joints and faces, projections of more than one (1) inch on beds pointed or hammered off where necessary, breaking joints at least six (6) inches, and laid close, with at least one good header to every three stretchers. Every

Laying and bonding.

stone shall be well set in a full bed of mortar, all joints and spaces to be completely filled with mortar into which small stones and spalls are to be packed, and the work to be thoroughly bonded. Any stone which has become loosened, for any reason, in the work after the mortar has set, must be relaid in fresh mortar; and wherever re-

Grouting.

quired by the engineer the work shall be thoroughly grouted.

Quality.

128. In all third-class masonry, the stones shall be sound, hard, durable, and of a quality approved by the engineer. For that portion of the work which is above ground, or above the bottom of the channel in the case of culverts, the masonry shall be broken-range rubble-work, in

Face stones.

which the face stones shall be rock-faced, with edges pitched to straight lines, no projections exceeding three (3) inches beyond said lines, parallel beds and rectangular joints. The beds and end joints, for at least six (6) inches back from the

Dressing beds and sides.

face, shall be point or hammer dressed so as to form mortar joints not more than three-fourths (¾) inch in thickness, and the face stones must also be at least six (6) inches thick, ten (10) inches wide, and twenty (20) inches long, except where different courses or ranges are fitted to each other, in which case somewhat smaller dimensions may

Manner of laying.

be used. Said stones shall be laid on their natural beds as headers and stretchers, with at least one-fourth of the number to be headers of

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ample length, evenly distributed through the wall, and with all joints well broken so as to secure the best possible bond. After the completion of the masonry, every mortar joint in the face-work shall be properly raked out and cleaned to a depth of at least one (1) inch, and

Pointing.

then neatly pointed up in the best manner with the mortar specified for the purpose.

Backing.

129. The backing of all said walls shall consist of large, sound, well-shaped stones, of approved quality, with good beds and joints, laid in full beds of mortar with joints properly broken, and arranged so as to thoroughly bond the work in all directions. Special care shall be taken to have all spaces and interstices completely filled

Grouting.

with mortar into which small stones or spalls are

tightly packed, and, where required by the engineer, the work shall be thoroughly grouted. The backing must conform, in general, to the requirements herein made for fourth-class stone masonry.

Culverts.

130. In the case of stone-masonry culverts, the upper course of the side walls shall have at least one-half of the stone headers, with the stretchers not less than fifteen (15) inches wide, and with no stone in said course less than six (6) inches thick. The covering stones shall all be sound, strong and durable, of approved quality, ranging from six (6) to — (12) inches or more in thickness, as will be directed in each special case, not less than eighteen (18) inches wide, and to lap not less than ten (10) inches with full width on each abutment. The sides or edges of said covering stone must be dressed to form butt joints not more than one (1) inch wide, which shall be filled with mortar and spalls, and covered in turn with suitable thin stones set in mortar. All cover stones shall be well bedded in mortar on the side walls, and properly pointed with mortar along said walls so as to make the work water-tight. The waterway of these culverts will not be less than two feet square, and of various sizes up to five by six feet with upper courses corbeled. The ends of all culverts shall be finished in such a manner as the engineer will direct. The quantity of third-class masonry to be paid for will be determined by measurements or estimates of the number of cubic yards actually built in conformity with the plans and directions of the engineer.

Cover stones.

Dressing edges.

Manner of laying.

Waterway.

End finish.

Payment.

Rubble masonry, where used.

131. **Fourth-class or common rubble masonry.**—Rubble masonry may be used for the foundations and backing of the walls of the entrance and overflow chambers, masonry and pipe conduits, culverts, creek crossings, gate vaults, retaining walls, and other structures built in open excavations; for filling the space between the sides of the excavation and the exterior of the masonry lining of the tunnel and shafts; and it may also be used as a substitute for concrete or brick masonry in any portion of the entire work where such a substitution may be deemed expedient by the engineer.

Classes of rubble masonry.

230 132. The rubble masonry will be made with natural cement, or with Portland cement, in the manner hereinafter specified, and when used by direction of the engineer, will be divided into the following classes, and payment for the estimated quantities of such masonry in

each class will be made according to the prices bid per cubic yard for such class and quality.

(*a.*) All rubble masonry made with natural cement and used in the foundations, backing and walls of the entrance and overflow chambers, masonry and pipe conduit, culverts, creek crossings, gate vaults and other structures built in open excavations.

(*b.*) All rubble masonry made with Portland cement and used in the foundations, backing and walls of the entrance and overflow chambers, masonry and pipe conduit, culverts, creek crossings, gate vaults and other structures built in open excavations.

(*c.*) All rubble masonry made with Portland cement and used in the foundations and backing of any lining masonry built in the tunnel and shafts.

Quality of stones.

133. The stones used in the construction of rubble masonry shall be hard, sound, durable, of good size and form, and free from dust, dirt, earth or other improper substance. Cobblestones and round boulders shall not be used unless they are first broken into well-shaped angular pieces. The greater portion of the stones must have beds of at least one (1) superficial foot in area, but in no case shall a stone of such magnitude be laid as to extend entirely through the wall, except where specially directed by the engineer. Care shall be taken to select the largest and best stones for the foundation and for the bond and face work, and to use the smaller ones for filling interstices.

Size of stones.

Manner of laying stones.

134. Each stone shall be laid in the work upon its broadest and best natural or quarry bed upon a thick layer of mortar of the quality above specified, and shall then be thoroughly pounded or settled down into place. The larger stones must be laid so as to break joints with each other, both laterally and transversely, so as to secure the greatest practicable amount of bond and strength; and all spaces or interstices occurring between said stones must be completely filled with said mortar, after which stone chips, fragments or spalls may be thrust therein and hammered down. Care shall be taken to avoid the formation of large and thick pockets of mortar alone, and to place stones of appropriate size and shape, well bedded in mortar, in all spaces or interstices of considerable magnitude. All stones shall be thoroughly wetted just before being laid in mortar, if required. No spalling under a stone after it is laid will be al-

Filling of interstices.

Stones to be wetted.

lowed. On the inner or exposed faces of the walls, all points or irregular edges projecting more 231 than one-half (½) inch beyond the face of each stone must be hammered off before laying, so as to leave the finished surface of the walls as smooth and true as practicable. Projections removed.

135. Proper attention shall also be given to bonding and constructing the rear of the walls in the best and most workmanlike manner. After the walls have been built as aforesaid, all joints on the inner or exposed faces thereof shall be properly raked out and cleaned to a depth of at least one-half (½) inch, and then neatly pointed and trimmed up in the best manner with the mortar specified above for pointing. Bond in backing. Pointing.

136. **Slope walls and paving.**—Dry rubble-stone masonry and paving are to laid without mortar, and may be used for the side slopes and bottom of water-courses which are carried over the conduit, for the bottom and approaches of culverts under said conduit, for the channels connected with overflows or waste-weirs, and for protecting embankments or earth slopes at such other places as the engineer may designate. This class of work shall be done with stone of suitable size and quality, laid closely by hand with as few spalls as practicable, and in such manner as to present a smooth and true surface conforming to the plans and directions. Joints must be broken as much as possible, and care shall be taken to secure the greatest amount of bond and strength. When laid against or upon any earth surface, the same shall in all cases be thoroughly consolidated, and the stones must be well bedded and pounded into the earth so as to leave no vacancies. Where paving is required to be laid upon a bed or layer of gravel, the same shall be put in place as directed. Slope walls and paving, where used. Manner of laying. Gravel under paving.

137. For laying in walls, the stones must be flat, of good size, and conforming in general to the requirements for rubble masonry laid in mortar. For paving, the stones shall be set on edge, and have dimensions not less than eight (8) inches deep, ten (10) inches long and three (3) inches thick; or if cobblestones are to be used for this purpose, they must be set with their longest diameter at right angles to the bed or foundation, and such diameter must be not less than eight (8) inches in any case. The depth and size of the paving stones will vary according to circumstances, as the engineer will direct. Payment Size of stones. Payment.

will be made for all such work at the prices bid per cubic yard therefor.

Riprap, where used.

138. **Riprap.**—When required by the engineer, the contractor shall protect the face of embankments or the foot of slopes from the action of running water by a facing of riprap stone, or of brush and stones, or by a retaining wall, as

Size of stones.

may be directed. The stones for riprap work will consist of rough, angular pieces, of large size, or angular boulders, containing at least two-thirds of a cubic foot, laid by hand upon the said slope by experienced workmen so as to form a layer of uniform thickness, with the largest stones

Manner of laying.

on the face and as well wedged together
232 and interlocked by other stones as possible.

All large interstices in the mass and next to the earth bank must be filled with suitable small stones. Round boulders shall not be used in the work. The extent and thickness of the layer of riprap will be determined by the engineer.

Laying brush and stone.

139. Where proper large and angular stones for riprap work are not readily available, the required bank protection may be made by courses of green brush, laid with the stems at right angles to the line of the bank and butts outward, alternating with courses of the largest available field stones, all the interstices being filled with small stones of any kind. The brush must be cut to the required length and be properly arranged in layers of uniform thickness, and the most suitable stones shall be placed on the outside of the work near the butts, care being taken to fill all spaces with coarse gravel or small stones, and to use an abundance of heavy stones in the interior of the mass to hold down the branches of the stems. The proper dimensions for all such work will be determined from time to time by the engineer, and payment therefor will be made at the prices bid per cubic yard, measured or estimated in place.

Payment.

Foundations.

140. **General, relating to masonry.**—Foundation for masonry may be of rock, earth, piles, timber or plank, according to local conditions. The precise character of the foundation at any given point cannot be determined in advance, but will be decided upon by the engineer as occasion demands. For this reason also, the exact cross-section of the proposed masonry conduit at different points, and definite plans for the appertaining structures, cannot be submitted in ad-

Character now indefinite.

Plans subject to alteration.

vance, and similarly with the other structures that may be required. All construction drawings exhibited at the time of letting shall therefore be regarded only as approximate, both in dimensions, character of materials and relative location. As the work advances, definite drawings and directions will be furnished by the engineer, as aforesaid. Where required by the engineer, rubble masonry may at any time be substituted for brick masonry or for concrete, and *vice versa*, provided that ten days' notice of such change be given to the contractor in cases where the volume of work thus affected exceeds fifty cubic yards; but when any such change affects a smaller volume, no notice will be considered necessary. It is also understood that when said changes are made, the contractor shall have no claim for extra compensation on that account.

Substitution of rubble masonry for concrete or brick-work, and conversely.

141. All bricks and stones must be clean when being laid, and particular care shall be taken to prevent any earth or other foreign substance from dropping upon the masonry, or becoming incorporated therein, during the process of construction. Should any such substance accidentally fall upon any unfinished wall, the same shall be thoroughly removed before the masonry at that point is continued.

Materials to be clean

233 142. Strong centers and satisfactory moulds, forms and bracing shall be provided and maintained in good condition at the contractor's expense. They shall in all cases be carefully cleaned before using. The centers shall not be removed until the back-filling or embankment has been raised at least two feet above the top of the arch, unless otherwise directed by the engineer. At least 150 lineal feet of straight centering for the upper arch of the proposed masonry conduit shall be used on each working section. These centers shall be constructed in such manner that the rear ones may be removed and carried forward under those still in place, and be set up again in front as fast as the arch-work of the conduit is built.

Centers, forms and bracing.

Length of centering for conduit.

Manner of construction.

143. On the completion of each working section of the said masonry conduit and the removal of the centering and braces, the entire interior surface of the lining masonry shall be carefully cleaned, pointed and smoothed, and if made of brick-work or concrete, shall then be washed over with neat Portland cement grout, applied with a brush in as thick a condition as practicable. The

Cleaning, pointing and applying cement wash.

interior faces of the lining masonry in all structures pertaining to said conduit, below the contemplated highest level of the water therein, shall also be treated in a similar manner. The cost of the said cleaning, pointing and washing with neat cement must be included in the prices bid per cubic yard for the different classes of masonry.

Manholes in shafts.

144. The shafts are to contain masonry manholes, where they extend through earth or such soft rock as, in the opinion of the engineer, cannot safely be left without lining or support.

Arches in shafts.

Where the rock is solid, hard and durable in said shafts, arches with suitable abutments and skewbacks in such rock shall be built across the entire horizontal section, and the intersection of such arches with the manholes must be groined in the

Manholes for conduit.

best and most workmanlike manner. Manholes shall also be constructed at such points as may be designated where the masonry conduit is built in open trench. Wrought-iron steps, brackets for ladders, beams, bolts, etc., shall be built into the masonry or fastened to the rock in the strongest manner and wherever required. All work in connection with the shafts shall be done as will be directed by the engineer from time to time.

Payment.

The masonry in all such structures will be paid for at the price bid per cubic yard for the same, only the actual volume of masonry built above or outside of the exterior lines of the conduit being considered.

Weepers.

145. At such points as may be directed, suitable weepers shall be built in the side walls and floor of said masonry conduit or tunnel, and in the masonry of shafts and manholes, but no deductions for such openings, when made in accordance with the engineer's directions, will be made.

Iron-work built into masonry.

146. All castings, pipes, bolts, rods, or other iron-work shown upon the plans, and such as may otherwise be required from time to

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time, shall be built into the masonry, and secured thereto, in the best and most workmanlike manner wherever required, and in full accordance with the directions of the engineer. The cost of putting such iron-work in place must be included in the price bid per pound for furnishing said materials when the same are to be furnished by the contractor, or else in the price bid for the masonry where said materials are furnished by the executive board.

Masonry to be kept free from water and frost.

147. No water shall be allowed to stand upon, or flow over or against, any fresh masonry until the mortar has had ample time to set, as will be determined by the engineer; and all unfinished masonry shall be properly protected from injury by water or frost during inclement weather. No masonry of any description shall be laid in open excavations during the prevalence of frost, or in general between the fifteenth day of November and the first day of April, except by special permission of the engineer. If the work is carried on in cold weather, the necessary means for warming brick, stone, sand, cement and water shall be provided at the contractor's expense, and all requirements of the engineer to thoroughly protect the masonry, during and after laying, from damage by frost shall be promptly complied with. No work shall be done on masonry, backfilling or embankment while the weather is unfavorable for the purpose, in the engineer's opinion.

Suspension of work.

Precautions during frost.

Masonry to be water tight.

148. The masonry must in general be made water tight at all points; and if, after the work is completed and tested, any leaks are discovered, the openings must be caulked or otherwise securely stopped. Any defects in the work, from any cause on the contractor's part, or discovered at any time, shall immediately be corrected at the contractor's expense, even if it be necessary to take down and entirely rebuild portions of it. Furthermore, the engineer shall have the right to open the masonry lining of both the tunnel and the conduit formed in open trench, at any time after the removal of the centering and at any points he may select, for the purpose of ascertaining whether said backing and filling has been performed properly; and wherever any defects in the work may thus be found, the same shall at once be remedied at the contractor's expense by injecting cement grout under pressure from a suitable pump into any cavities, or by taking down and properly rebuilding the work in accordance with these specifications, or by such other means as may be approved by the engineer. In case cement grout is used, as aforesaid, the same shall be prepared by mixing not more than one (1) part of sand with one (1) similar part of cement. The inspection of workmanship and materials furnished by the contractor, and their acceptance by agents of the executive board, shall not relieve the contractor from any respon-

Correction of defective work.

Searching for defective work.

Injecting grout into defective masonry.

sibility or obligation in the proper performance of the work.

Measurement.

235 149. The quantity of masonry to be paid for will be determined by measurements or estimates of the number of cubic yards actually built, in conformity with the aforesaid diagrams, limitations and conditions and the plans and directions of the engineer, no allowance for angles or corners being made in any case, and all openings, except grooves or rabbets, being deducted. No other constructive or conventional measurement of the volume of any kind or class of masonry will be allowed.

150. **Timber-work in foundations.**—The contractor shall, when required, construct a foundation of wooden piles or timbers for the pipe conduit and its appurtenances. The piles shall be of oak, ash, chestnut, elm or spruce, straight, sound, not less than six (6) inches in diameter under the bark at the point, and of sufficient length to drive well into the substratum. The required length of the piles will be determined from borings to be made at the contractor's expense, after the excavation has reached the grade contemplated by the engineer. Piles driven twenty feet or more shall not be less than ten (10) inches in diameter under the bark at the place where they are cut off for capping; and of those driven to a less depth, a certain proportion, to be determined by the engineer, may have a diameter of not less than eight (8) inches at said place of cutting off. All piles broken or seriously injured while driving, or driven off from the required lines, must be replaced at the contractor's expense.

Piles.

Length and diameter.

Driven in rows and sawed off.

151. The piles shall be driven in rows, according to the engineer's directions, and shall be sawed off evenly at the required grade, so that the timber caps which rest upon them will have a firm and even bearing. The pile-work will be paid for at the price bid per lineal foot of each pile satisfactorily driven in the foundation, not including the ends which were sawed off.

Payment.

Capping timber.

152. For capping the piles, suitable oak, ash, chestnut, spruce or pine timbers shall be used. All such timber must be straight, sound, of good grain, and free from cracks, shakes, loose knots, bark, rot, and other defects that may impair its strength and durability, and shall be sawed to such dimensions as will be directed. Similar requirements will be made for the timber which is to be used for placing directly upon the bottom

of excavations as a foundation. The caps for piles are to be securely fastened to the latter with wrought-iron drift-bolts, of such diameter and length as the engineer will direct, one such bolt being driven into the top of each pile.

Drift-bolts for capping timbers.

153. The spaces between the piles, and between the said caps up to the level of the top thereof, shall be back-filled with such material and in such manner as the engineer may direct. If this material is the same as was excavated in the locality, the cost of said back-filling must be included in the price bid for excavation.

Filling spaces between piles.

236 154. When a timber platform is to be used as a foundation, the sills will be laid either transversely or longitudinally at such intervals as will be directed, and in such a manner as to cause each timber to be firmly and securely bedded upon the soil throughout its entire length, and to have the upper faces of the timbers all in the same place, as contemplated by the drawings. The spaces between said timbers shall be compactly filled out with concrete, or such other material as the engineer will direct, well pounded and rammed into place, and brought up even with the top of the sills, whereupon a flooring of plank shall be securely spiked to each sill, with spikes of such dimensions as will be directed. Where the timbers are required to be placed close together, the spaces between the same shall be filled with cement grout, if required,

Timber foundation.

Filling spaces between timbers.

155. The plank flooring shall be entirely of sound oak, or pine, of good grain, and free from shakes, cracks, large or loose knots, bark, rot and other defects. The planks must be sawed to a uniform thickness, and have straight and parallel edges throughout, so that they can be laid close together upon the sills. All spaces between the planks shall be filled with cement grout, if required, and the ends of the planks shall be sawed off squarely and evenly where they abut, so as to make a close joint.

Plank flooring.

Filling spaces.

156. If a cradle is used in any locality as a foundation for the pipe conduit, it will consist of strong transverse ribs of plank, cut to the required form and well spiked together, and a single or double lining of boards or planks, securely nailed to each rib. The planks and boards used for this purpose shall be of the best quality, uniform in thickness, straight-edged and laid so as to make the work as water tight as practicable.

Cradle.

Precautions in draining foundations.

157. Where a pile or timber foundation is used, the contractor must exercise the utmost care to prevent the material underneath from being washed away by any of the pumping, bailing and draining operations, or otherwise; and if the use of suitable drain-pipe in the foundation has for any reason been omitted, the pumps must be shifted frequently to avoid damage from undermining caused by drainage from too long a distance.

Payment for timber and plank.

158. The timber and plank used in foundations and left permanently in place, as aforesaid, will be paid for at the price bid per thousand feet, B. M., it being understood that the quantities will be computed from measurements or estimates of the amount actually left in the work in accordance with the plans and directions of the engineer, and with no allowance for loss or waste.

Payment for iron-work in foundations.

159. The iron-work furnished and put in place by the contractor in said foundation, including fastening, will be paid for at the price per pound bid therefor, the quantities being determined by measurements or estimates of the amounts actually driven in the work in accordance with the plans and directions of the engineer, and with no allowance for loss or waste.

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Permanent wooden roadway bridges.

160. **Piles and timber-work for bridges.**—Several permanent wooden roadway bridges may be constructed over the outlet of Hemlock lake and Honeoye creek at such places as the engineer will designate. Where masonry piers and abutments are not required, said bridges will be supported on piles, and will have inclined timber approaches also supported on piles, the whole to be constructed by the contractor in accordance with the plans and directions of the engineer.

Approaches.

Quality and size of piles.

161. The piles must here be of sound white oak, perfectly straight, well trimmed, free from rot, and stripped of all bark, not less than (8) eight inches in diameter at the point and twelve (12) inches in diameter at the butt where they are sawed off for capping, and of sufficient length in all cases to drive well into the hard substratum.

Driving.

Each pile shall be driven until it does not descend more than one-half inch under the last blow of a hammer weighing two thousand (2,000) pounds falling ten (10) feet, or falling as much more than ten feet as the engineer may direct.

Length.

The necessary length of the piles will be determined from borings to be made or test piles driven

at the contractor's expense. All bearing piles must be accurately spaced and driven vertically, and the brace piles in each row or bent shall be driven at the angle shown on the plans. The piles shall be sawed off evenly at the required elevation or grade, and shaped so as to form a tenon, three (3) inches wide and twelve (12) inches high and long, with true and square bearing shoulders, on the head of each. The pile work will be paid for at the price bid per lineal foot of each pile satisfactorily driven in place, not including the ends which were sawed off.

Spacing.

Sawing off and forming tenon.

Payment.

162. The capping for each bent will consist of two clamp timbers, six inches wide and twelve inches deep; said timbers will be thoroughly bolted togther, through the pile tenons and elsewhere, as shown. For bracing the bents at least two planks ten inches wide and three inches thick will be used diagonally, in connection with the required four by twelve inch horizontal clamping timbers at the ground line or water surface. The base clamps and braces will be properly notched into the piles where required, and bolted with three-fourths inch diameter bolts with heads, nuts and washers, as shown. The several bents on each side of any bridge will be connected by two lines of stringers, not less than eight inches wide and ten inches deep, securely fastened to the said capping and also to the ends of the lower chords of said bridges. Suitable posts shall then be properly fastened to said stringers and braced to the capping timbers, after which a strong rail will be attached to said posts and bridge truss. All of the aforesaid timbers shall be of the best quality of white oak or white pine.

Capping.

Bracing.

Clamps.

Bolts.

Stringers.

Post and railing.

Quality.

238 163. The bridge trusses shall be constructed of the best quality of white-pine timber, in accordance with the plans therefor furnished by the engineer, and are to be connected together at the bottom by white-oak transverse floor beams at the foot of each pair of iron suspension rods. The floor joists, throughout the bridge and approaches, shall be of white oak or white pine, of such dimensions as will be directed, and the floor planks shall be of oak strongly spiked to every joist. Suitable oak fender timbers, eight inches wide and deep, shall be bolted to the flooring or other parts of the structure. Lateral bracing of pine or oak plank shall be placed under the floor joists, the ends of such braces to be properly boxed into the sides of the transverse beams;

Timber for trusses.

Floor beams.

Floor joists and plank.

Fenders.

Lateral bracing.

said braces are also to be bolted together at their intersection, and secured to the joists or floor plank, as shown upon the plans. If required by the engineer, iron rods three-fourths inch in diameter shall be substituted for lateral braces, such rods to be connected to the transverse beams by suitable eyes and bolts, and to be provided with a proper turn-buckle near one end. The various components of every truss shall consist of single sticks of timber wherever practicable, and all surfaces thereof shall be neatly planed and painted with three good coats of the best white lead and linseed oil paint.

Iron sway-rods.

Planing and painting trusses.

164. All the timber and plank used in the above-described work shall be of the best and soundest quality throughout, well seasoned, free from large, loose and unsound knots, also from shakes, cracks, sap, rot, wane and other defects; said material shall be thoroughly examined and culled before being put in place, and will be subject to the approval of the engineer at any time. Any defective material, or such as is not fully up to the required dimensions, shall be rejected wherever discovered by said engineer, and shall at once be removed at the contractor's expense. The framing of all parts of the work shall be done in the most skillful and workmanlike manner, and all joints are to be thoroughly painted, as aforesaid, and put together while the last coat is still fresh. Care shall be taken to obtain the timber, plank and iron rods of not more than the required lengths, in conformity with the bills of timber and iron made out by the engineer, as all excess of material beyond such lengths will be at the contractor's expense.

Quality of timber.

Inspection.

Defective material.

Framing.

Superfluous material.

165. Payment for the above-described pine timber-work in the bridge trusses will be made separately at the price bid per thousand feet, B. M., of this class of timber in place, said price to include all of the required lumber, paint and labor of every description involved in the proper erection of said trusses upon their final supports. All other timber-work in the bridges and the approaches thereto will be paid for separately at the price bid per thousand feet, B. M., for this class of material in place, said price to include all costs of lumber, framing and erection. The iron-work in the bridges and approaches will be paid for at the price bid per pound of such material put in place in accordance with the plans and directions of the engineer. It is also

Payment for bridge trusses.

Payment for other timber-work in bridges.

Payment for iron-work.

distinctly understood that no payment will be made for any false work that may be required in the construction of said bridges or approaches, nor for any temporary bridges of any character that the contractor may deem it necessary to construct for his convenience in the delivery of material or the prosecution of his work, or otherwise, anywhere along the line of the conduit, or on any public or private road leading thereto. All existing bridges and culverts on any road used by the contractor for the delivery of material must be kept in perfectly safe and proper condition at his expense.

No payment for scaffolding or false work.

Existing bridges and culverts to be maintained

166. **Creek crossings over channel.**—At any place where the pipe conduit is to be carried over the outlet of Hemlock lake or Honeoye creek on a permanent iron bridge, the contractor shall construct suitable piers, abutments and approaches according to plans which will be furnished at the proper time in each case by the engineer. The metal-work of such permanent bridges will be furnished and erected upon said piers and abutments by the executive board; and on the completion of each structure, the pipe must be carefully laid with proper bearings thereon by the contractor, truly to the required lines and grades. Care must be taken not to cause undue stresses in any member of any such bridge by improperly attaching thereto the appliances used for placing or laying the pipe. Payment for furnishing and laying the pipe on said bridges will be made at the price bid per lineal foot for such pipe placed in the remainder of the work.

Abutments, piers and approaches.

Iron bridges furnished.

Laying conduit pipe on such iron bridges.

Payment for laying pipe.

167. After being laid in or upon such bridge, the pipe shall be enclosed in a square or octagonal casing, formed of two thicknesses of two-inch planed and matched white-oak plank, with an intervening air space. Said casing must be furnished and put in place by the contractor in accordance with the plans furnished by the engineer. All exposed surfaces must be planed and painted with three coats of white lead and linseed oil paint, as heretofore specified for timber bridge-work. Any non-conducting material that may be used within said casing, or the air space, or other compartments thereof, will be furnished and put in place by the executive board, and the contractor must afford the necessary access to the work for this purpose from time to time as the same is being constructed. Any iron-work for straps, hinges, hasps, etc., for trap-doors or other

Casing for conduit pipe.

Planing and painting the casing.

Filling material furnished.

Iron-work for casing.

means of access to the pipe that may be shown on the plans, must be furnished and put in place by the contractor.

Payment for casing.

168. Payment will be made for furnishing, constructing and painting the said casing at the price bid per thousand feet B. M., for pine timber-work in bridge trusses, the estimate to include only the material actually put in place, with no deduction for wastage; and for the iron-work, including furnishing and putting in place, at the price bid per pound therefor throughout the remainder of the work.

240

Payment for iron-work.

Crossings under channel.

169. **Creek crossings under channel.**—At any place where the conduit pipe is directed to be carried under the outlet of Hemlock lake or Honeoye creek, the work will be done according to special plans furnished by the engineer, and in conformity with the lines and grades given by him. The contractor shall provide means, by cofferdams or otherwise, for excluding the water from the excavations, and must furnish and operate sufficient and satisfactory pumps and other appliances for keeping such excavations dry and in proper condition for laying and testing the pipes, also for putting in place any required foundation, concrete or masonry. The space within the cofferdams must be ample for allowing the pipe trench to be excavated and maintained, the foundation to be prepared, and the pipe to be laid in a convenient and safe manner. For all such work of cofferdamming, bailing and draining, the contractor must assume full responsibility, and payment therefor will be made at the gross amount bid for each crossing.

Excluding water.

Cofferdams.

Payment for cofferdams, etc.

Trench for conduit pipe.

170. The pipe trench will, in general, be excavated to a level bottom under the channel, with sloping approaches on each side of the stream; the depth of said trench to be such as will bring the top of the pipe about two (2) feet below the bed of the channel in the deepest place, and also allow ample room for the requisite foundation. The trench must furthermore be made at least one (1) foot wider on the bottom than in ordinary work, and when greater dimensions are not ordered by the engineer, the volume of excavation will be computed on the basis that the bottom width is two (2) feet more than the internal diameter of the conduit pipe. Payment for said excavation in creek crossings will be made at the same prices that are bid per cubic yard for making other open excavations for the conduit pipe.

Width of trench.

Payment for excavation.

Foundations, masonry, etc., for pipe.

171. The contractor shall furnish and put in place all necessary foundations, timber work, concrete and masonry for the support of the pipe and for cut-off walls, in accordance with the terms and provisions elsewhere herein specified; and after the pipe has been properly laid and tested, he shall do all of the required back-filling in the manner already described, the cost thereof to be included in the price bid for the said excavation. Where the sides of the trench in the channel of the stream have been sheeted, the planks shall be neatly cut off not less than six (6) inches below the surface of such channel, unless the engineer shall direct the entire removal of the same; and payment for the lumber thus left in place, up to said height and a thickness of not more than two (2) inches, will be made at the rate of fourteen (14)
241 dollars per thousand feet, B. M. All cofferdams, piles and other obstructions which the contractor may have placed in the channel of any stream for the purpose of making a crossing, shall be completely removed, and the waterway left of the same size and form as before the work was commenced. The cost of removing said dams and other obstructions, of clearing away all surplus material from the work, and of all labor involved by unusual conditions or unforeseen contingencies, must be included in the gross sum bid for bailing and draining at each crossing.

Back-filling.

Sheeting.

Payment for sheeting left in place.

Removal of cofferdams and obstructions.

Payment for laying pipe conduit.

172. The furnishing and laying of the conduit pipe in said crossings will be paid for at the price bid per lineal foot for such pipe placed in the remainder of the work, and any additional cost incurred thereby must be included in the gross sum bid for cofferdamming, bailing and draining at each crossing; furthermore, all slope paving, riprap, or other surface protection that may be required at the sides of the crossings or upon the banks of the creek, shall be furnished and put in place by the contractor in the manner herein specified, and will be paid for at the price bid per cubic yard therefor.

Channel protection.

Railroad crossings.

173. **Railway crossings.**—Where the conduit is to cross under any railway the work shall be done in accordance with special plans which will be furnished by the engineer from time to time. In general, such work will be commenced by removing the material under the ends of the cross-ties of each track, and laying one or more suitable timbers under said ties below each rail,

Manner of doing the work.

Longitudinal and transverse timbers.

such timbers to be securely and evenly bedded for their entire length, and the ties to be properly adjusted to them. Similar transverse sills may also be required to be placed under the aforesaid longitudinal timbers at or near the ends thereof, and on each side of the contemplated excavations.

Trench for walls.

A trench of sufficient width to admit of the construction of one side wall as per plans, shall then be excavated without further disturbing said track or timbers, and shall be carried down to such

Sheeting and bracing trench.

depth as will be directed. The sides of the excavation must be securely protected by sheeting and bracing, and the said track timbers shall, if required, be supported or shored by suitable posts resting upon adequate temporary foundations in the trench.

Foundation.

174. On the completion of the trench as directed, the requisite foundation shall be made and the wall carried up to the bottom of the cross-ties

Character of masonry.

in accordance with the plans. The masonry shall be of the character herein described as "third-class," or rubble work laid in cement mortar, but if required the same shall be of "second-class,"

Filling behind walls.

or abutment masonry. All spaces between the back of said wall and the side of the trench must be compactly filled with suitable earth as aforesaid, and the longitudinal timbers shall be securely

Timbers.

bedded in and upon the masonry. If so directed,

Iron beams.

said timbers shall afterwards be removed 242 and replaced with suitable iron beams which must be properly set in the wall.

uilding second wall.

After having finished one such side wall in this manner the trenching and masonry operations will be repeated for the other wall, it being assumed that the heavy timber-work placed under the tracks is of sufficient length to embrace both walls and extend a sufficient distance beyond the backs of said walls.

Interference with water-courses, etc.

175. **Pipes, culverts, and water-courses.**—Wherever it may be necessary to cross, alter, divert, or interfere with any existing pipes or culverts and natural or artificial water-courses, the work shall in general be done according to the directions of the engineer; but in all cases the contractor shall make, at his own expense, ample and secure provisions for temporarily carrying the water across or along the conduit work, or for diverting the flow into other proper channels.

Resulting damages.

Any damage by rain or floods or resulting from a failure on the contractor's part to make such provisions, must be borne by him alone.

Restoration of pipes, ditches, etc.

176. On the completion of the conduit in any locality where the original surface of the ground is not to be permanently altered, and where such pipes, culverts, ditches, or water-courses of any kind exist and are to be carried over the conduit, the same shall promptly be replaced and restored at the contractor's expense in the best and most workmanlike manner, to the full satisfaction of the engineer. Any additional masonry that may be required over the conduit for the support of such pipes or for forming a channel for a water-course, will be paid for at the prices bid per cubic yard for such quality of masonry constructed in open excavations when built in accordance with the plans and directions of the engineer.

Supporting masonry for pipes, etc.

Excavation for permanent new channels.

177. In localities where permanent new channels for water-courses of any description are required to be made and carried over the conduit, any excavation ordered by the engineer for the formation of such channels will be paid for at the same prices as are bid per cubic yard for roadway grading, as aforesaid.

Pipes and culverts under conduit.

178. Wherever any pipe, culvert, or water-course of any kind is to be permanently carried under the conduit, special plans and directions for such work will be given by the engineer, and the contractor shall furnish and put in place all necessary materials for the purpose. Payment for the various items of work thus performed will be made at the same rates and under the conditions as herein specified for the construction of the conduit in open excavation, it being understood that the engineer shall have the right to designate from time to time the quality and dimensions of the materials to be used, as well as the mode of construction.

Manner of payment.

Cast-iron culvert pipes.

243 179. When cast-iron pipes are used for culverts they shall be put together with properly made and caulked hot-lead joints, the depth of such lead in the socket being not less than two (2) inches in any case; and when vitrified earthenware pipes are thus used, the socket joints shall be completely filled with Portland cement pointing mortar, as elsewhere herein specified. Both kinds of pipe shall be laid true to line and grade, as directed by the engineer, in the best manner, and all pipes must be of the best quality and perfectly sound in every respect after being laid in place. The vitrified earthenware pipe used shall be of the heaviest and thickest kind, and the cast-iron pipe shall be of the

Vitrified earthenware culvert pipes.

Manner of laying.

Quality of pipes.

Payment.

standard weight and thickness commonly used for water-works purposes. The prices bid for furnishing and laying such pipes must be per lineal foot, complete.

Back-filling or embankment.

180. Special care must be taken in the back-filling or embankment around such pipes or other culverts to use only selected earth material, and to compact the same thoroughly by pounding or ramming and puddling as the engineer will direct. The cost of this work must be included in the prices bid for excavation. All culverts and embankments shall be fully completed at least one month before the construction of the conduit over the same, and if required by the engineer, all such embankments shall previously be thoroughly wetted and allowed to settle at the contractor's expense.

Time for completing embankments.

STEEL AND CAST-IRON PIPE AND APPURTENANCES.

Character and chemical composition.

181. **Requirements for steel plates.**—The steel shall be of the class termed "soft" and shall be made by the open-hearth process. It shall contain not more than six one-hundredths (0.06) per cent. phosphorus and six one-hundredths (0.06) per cent. sulphur, and sixty one-hundredths (0.60) per cent. manganese.

Analyses to be furnished.

182. Chemical analyses of each "heat" or "melt" shall be made by the manufacturer at the contractor's expense, and properly certified copies of the final analyses of the material shall be furnished to the executive board as the work progresses.

Physical tests.

183. Physical tests to determine the tensile strength, elastic limit, elongation, softness and ductility of the material of each "heat" or "melt" shall also be made at the contractor's expense by experienced inspectors whose services may be satisfactory to the said executive board. For the purpose of identification, the "heats" or "melts" shall be numbered consecutively, and the corresponding number stamped upon each plate or sheet produced therefrom. The test specimens shall in all cases be taken from the shearings of at least twenty per cent. (20%) of the plates produced from each "heat" or "melt," such plates or sheets to be selected at random by said inspectors or the engineer, and properly certified copies of the records

Heats to be numbered.

Test-pieces.

of such tests shall likewise be furnished to said board as the work progresses.

Tensile tests.

184. Tensile test specimens to be eight (8) inches long and one and one-half (1½) inches wide between measuring points. Tensile strength to be between the limits of fifty-five thousand (55,000) and sixty-five thousand (65,000) pounds per square inch. Elastic limit to be not less than thirty thousand (30,000) pounds per square inch. For plates three-eighths (⅜) inch thick or more, the elongation to be not less than twenty-five per cent. (25%) longitudinally of the plate, and twenty-two per cent. (22%) transversely of the plate; for plates thinner than three-eighths (⅜) inch, elongation to be not less than twenty-two and one-half per cent. (22½%) longitudinally and twenty per cent. (20%) transversely of the plate.

Bending tests.

185. Bending test specimens cut lengthwise or crosswise from the sheet to be six (6) inches long and one (1) inch wide, to be bent 180 degrees upon itself when cold, and hammered down flat, without sign of fracture on the outside of the bent portion.

Punching tests.

186. Punching test specimens to be one and three-fourths (1¾) inches wide and not less than ten (10) inches long, in the middle of which a row of not less than eight (8) holes three-fourths (¾) inch diameter, spaced one and one-fourth (1¼) inches between centers, shall be punched without causing any cracks.

Drifting tests.

187. Drifting test specimens to be three (3) inches wide and not less than five (5) inches long, in which not less than two (2) holes three-fourths (¾) inch diameter, spaced two (2) inches between centers and one and one-half (1½) inches from the edges, shall be punched and then enlarged by blows from a sledge-hammer upon a drifting pin until said holes are at least one and one-fourth (1¼) inches in diameter, without causing any cracks; such enlargement to be done cold.

Other tests.

188. The plates must also admit of cold hammering or scarfing to a fine edge at the laps without cracking, and the test pieces must furthermore withstand such quenching, forging and other tests as may suffice to exhibit fully the temper, soundness and fitness for use of the material. The failure of said test specimens, when taken at random as aforesaid from the finished product of any "heat" or "melt," to conform to the above requirements, will be sufficient cause

for the rejection of the entire product of such "heat" or "melt."

Quality of plates.

189. The plates shall be free from lamination and surface defects, and be fully up to the required gauge for thickness on the edges. Any plate whose thickness at any point may be found less than ninety-five per cent. (95%) of the required thickness, shall be rejected without appeal; furthermore, at least ninety per cent. (90%) of the plates must be of the full required thickness at all points. Said plates shall be rolled as flat and sheared as accurately as good mill practice will permit, but in no case shall they be scant of the prescribed or intended dimensions, and must be in all respects of a good merchantable condition. The executive board or engineer shall have the right, at all times, to inspect the manufacture and testing of any and all plates and shall have, if so required, one-fourth of the number of test-pieces, to be prepared as above, to test or to have tested under its own supervision and at its own expense.

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Inspection of manufacture.

Defective plates rejected.

190. It is further understood and agreed that any plate that shows any defects during the process of punching, bending and reveting for manufacturing into pipes shall be rejected, notwithstanding that the same may previously have been satisfactorily tested.

Rivet steel.

191. **Requirements for steel and iron rivets.**—Rivet steel shall be soft and have a tensile strength between the limits of fifty-four thousand (54,000) and sixty-two thousand (62,000) pounds per square inch, with an elastic limit of not less than thirty thousand (30,000) pounds per square inch, and with an elongation of not less than twenty-six per cent. (26%) in a test-bar eight (8) inches long between measuring points and full diameter of rivet, and with a reduction of cross-sectional area at the point of fracture of not less than fifty per cent. (50%). The material shall also be of such quality as will stand bending double and flat, before and after heating to a light yellow heat and quenching in cold water, without sign of fracture on the convex surface of the bend. All steel rivets not conforming to the above requirements will be rejected.

Physical tests.

Rivet iron.

192. Rivet iron shall be tough, ductile, uniform in quality, and thoroughly malleable, and shall have a tensile strength of not less than fifty thousand (50,000) pounds per square inch, with an elastic limit of not less than twenty-six thousand

Physical tests.

(26,000) pounds per square inch, and a minimum elongation of eighteen (18) per cent., measured on an original length of eight (8) inches. Sample bars of the material shall bend cold 180 degrees to a curve whose diameter is equal to the thickness of the rod tested, without sign of fracture on the convex side. The rivets must be free from splits, cracks, rust and other defects. All iron rivets not up to the above requirements will be rejected.

All metal to be kept under cover.

193. **Protection of metal.**—All plates and rivets must be free from rust and be kept under cover, from the time of manufacture of the plates until the completed pipe is dipped or coated. At the factory, the plates must be loaded under cover upon suitably covered cars; they must be delivered under cover at the pipe shop, and must be kept under roof and cover until ready for shipment, and in no way exposed to the weather or to moisture. In case of accidental rusting,

246 the rust must be removed from the plates in the manner hereinafter specified before proceeding with the manufacture of the pipe.

Removing rust.

Size of plates.

194. **Manufacture of pipe.**—The sheets or plates must be of such dimensions as to admit of being rolled into true cylinders not less than six (6) feet in length and of the required internal diameters, with ample allowance for the necessary overlap at the single longitudinal seam of each such cylinder. One-half of the whole number of sheets will be formed into "inside courses," or cylinders, having the specified internal diameter of the conduit pipe, and the remaining half into "outside courses," or cylinders, whose internal diameter shall be exactly equal to the external diameter of the inside courses, said courses alternating and forming a tight fit with each other before any protective coating is applied to the metal.

Inside and outside courses.

Diameter of pipe.

195. The conduit pipe shall be either thirty-eight (38) inches or forty (40) inches in internal diameter of the said inside courses, as will be decided by the executive board before the work is commenced, and it is contemplated in these specifications that said conduit will in general be a continuous riveted tube throughout its entire length, without expansion joints or other mechanical provisions for taking up changes in length due to variations in temperature. The internal stresses produced in the metal by such variations of temperature within a range of 45° F.

Pipe to be continuously riveted, without expansion joints.

Temperature stresses.

must be provided for in the design of the pipe, and for this purpose the tensile strength of the net section of plate of the circular seam of any inside course must be equal to the shearing strength of the rivets in said seam, it being assumed that the allowed shearing stress in said rivets is eight thousand (8,000) pounds per square inch, while the allowed tensile stress in said plate section is twelve thousand (12,000) pounds per square inch; furthermore, in making such computations, the sectional area of the rivets shall be obtained by using the nominal or specified diameter of the rivet instead of the diameter of the rivet hole.

Equality of strength of net plate and rivets.

Thickness of plates.

196. The thickness of the steel plates for the pipe shall in no case be less than one-fourth ($\frac{1}{4}$) inch, and the same will be increased to five-sixteenths ($\frac{5}{16}$) inch, and three-eighths ($\frac{3}{8}$) inch in such localities as the engineer will designate.

Edges to be planed.

197. The edges of each plate must be properly planed or cut to true lines and beveled for caulking all around; and at the end of each course, where the lap of the longitudinal seam occurs, the plate must be reduced by cold hammering or planing, or both, to a fine edge, through which one of the rivets of the round seam must be driven to insure tightness. In addition to this rivet, still another rivet must be driven through the three thicknesses of plate at such joints. Each plate must be rolled to a perfect cylinder of the required diameter.

Reducing thickness at laps.

Plates to be rolled into true cylinders.

Spacing and punching rivet holes.

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198. All rivet holes must be spaced with precision, and in punching the same, the punch shall be applied to the side of the plate which is to be placed in contact with another. In punching said holes, the best and sharpest dies and punches are to be used, and all burrs caused by the punch on the lower side of the plate shall be removed by countersinking. The holes must all coincide to within one-thirty-second ($\frac{1}{32}$) of an inch, otherwise they are to be enlarged by a sharp reamer or drill. No drift-pins shall be used in forcing rivet holes to coincide at any seam or lap; and all plates in which the said holes cannot be made to receive a rivet of the specified diameter, with such slight drifting or reaming as will not, in the opinion of the engineer, materially reduce the strength of the plate, will be rejected.

Holes must coincide.

No drifting allowed.

Shop riveting.

199. All riveting in the shop must be done with hot steel or iron rivets, and by steam, compressed air, or hydraulic machinery, exerting a

slow pressure and retaining it sufficiently to perfectly form the rivet heads before the metal loses its red color. All rivets when driven must fill the holes completely, and have heads of such form and size as will be directed by the engineer. Care must in all cases be taken to have the rivets of the right heat to produce the best and most solid work, and any rivet that may at any time or place be found defective or appear to have been overheated, shall be cut out and replaced at the contractor's expense by one which is sound in all respects. All rivet heads must be perfect in form and truly concentric with the shank or shaft.

Form of rivet heads.

200. At each junction of the straight seam and the round seam where three thicknesses of plate come together, and in all places where castings of any description are to be attached to the pipe, special rivets of extra length must be provided and driven.

Special rivets.

201. Immediately before any rivet is driven, the plates must be perfectly clean and be brought into close contact by suitable pressure apparatus, and must be rigidly held together thereby until the rivet heads have been formed and lost their red color, as aforesaid.

Plates must be clean.

202. The rivets used for attaching castings of any description to the pipes and connecting together plates or courses in the field, or by handwork in the shop, shall in all cases be of the best quality of wrought iron, and be driven in the best and most workmanlike manner in every respect. All provisions herein contained, relating to riveting done in the shop, shall also apply, as far as practicable, to rivets driven in the field, or along the line of the conduit.

Field or hand riveting.

203. All circular seams may be single riveted, except where pipes of different thickness are to be connected together, in which case all circular seams in the thinner pipe, for a distance of about 200 feet from the junction with the thicker pipe, including the junction seam, shall be double riveted. The longitudinal seams may be single riveted wherever the greatest water pressure in the conduit, after its completion, will not exceed seventy (70) pounds per square inch; but where greater pressures occur, all such seams shall be double riveted.

Circular seams.

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Longitudinal seams.

204. The proportions to be used in laying out and making the riveted joints or seams shall in general be as follows, all figures being in inches:

Table of proportions for riveting.

Diameter of pipe, inside courses....	38	38	38	40	40	40
Thickness of plate..	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{1}{4}$	$\frac{5}{16}$	$\frac{3}{8}$
Diameter of rivets..	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{3}{4}$	$\frac{3}{4}$
Diameter of rivet holes.....	$1\frac{1}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$	$1\frac{1}{16}$
From center of rivet to edge of plate..	1	$1\frac{3}{16}$	$1\frac{3}{8}$	1	$1\frac{3}{16}$	$1\frac{3}{8}$
Approximate pitch of rivets in single riveted seams, round or straight.	1.506	1.755	2.007	1.506	1.755	2.007
Approximate pitch of rivets in double riveted straight seams, rivets being staggered. ...	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$	$2\frac{1}{4}$	$2\frac{1}{2}$	$2\frac{3}{4}$
Distance between rows in double riveted straight seams.....	1	$1\frac{1}{4}$	$1\frac{1}{2}$	1	$1\frac{1}{4}$	$1\frac{1}{2}$
Number of rivets in single riveted round seams.....	80	69	60	84	72	63
Lap of plates in single riveted seams.....	2	$2\frac{3}{8}$	$2\frac{3}{4}$	2	$2\frac{3}{8}$	$2\frac{3}{4}$
Lap of plates in double riveted straight seams, rivets being staggered.....	3	$3\frac{3}{8}$	$4\frac{1}{4}$	3	$3\frac{3}{8}$	$4\frac{1}{4}$

Dimensions, approximate.

205. The dimensions given in the foregoing table are to be regarded as approximate, and subject to modification before the material for the pipe is definitely ordered by the contractor; and any modification proposed by said contractor shall be subject in detail to the approval of the engineer before being carried into effect.

Manufacturing courses into pipe.

206. The pipe is to be manufactured in lengths of four or more courses each, the outside and inside courses alternating with each other, so that each length will have an outside course on one end and an inside course on the other end; also in such manner that the straight seams will alternate to the right and left not more than one foot.

Formation of angles or curves.

207. Where angles or curves occur in either the alignment or the grade of the conduit, the plates must be cut and punched to the required lines for forming a small oblique angle at the round seams of as many courses as may be needed to produce the given total deflection or curvature in each locality, and the courses must be put together with the straight seams alternating as aforesaid. In general, the deflection angle formed

by two consecutive courses may range from one (1) to five (5) degrees in horizontal or vertical projection, according to the locality; but greater deflection angles shall not be made except as specifically ordered by the engineer. The work must furthermore be laid out so as to bring all straight seams on the upper half of the pipe throughout its entire length.

All straight seams to be on top of conduit.

Formation of reducers.

208. In forming reducers, or tapering courses, the plates must also be cut and punched to the required lines along the four edges so as to
249 bring the pitch-line of the rivets in the round seams into planes parallel with each other and at right angles to the axis of the course or pipe.

Formation of branches, etc.

209. All other special pieces required for the conduit, such as branches for lateral connections or overflows, closing pieces, sections containing openings for manholes, blow-offs and air valves, and pieces involving any other kind of boiler-makers' work not now foreseen, shall be manufactured in the best and most approved manner, in conformity with the directions of the engineer.

Reinforcement rings or plates for lateral openings.

All openings for lateral branches, manholes, blow-offs and air valves, must be provided with suitable reinforcement rings or plates, cut, punched and rolled to the proper form in each case, not less than one-fourth (¼) inch in thickness, and made of the same material as the plates for the conduit pipe. Said rings must fit closely between the exterior of the pipe and the flange of the castings, and be held in place by the rivets which pass through said flange and the pipe.

Reinforcement rings for end fittings.

210. Similar reinforcement rings shall also be used where cast-iron flanges, bells or spigot pieces are riveted to the ends of any pipe for any purpose, and the seams of such rings shall also be welded together if required. To avoid multiplicity of patterns for said rings, flanges, bells and spigots, all such fittings shall be applied only to inside courses of the conduit pipe; and where the same are used, the contractor must in each case furnish an additional inside course, correspondingly equipped and adapted for connection with the outside course of the following section of pipe by means of rivets as in other round seams.

All end fittings to be riveted to inside courses.

Stiffening and anchor rings.

211. Stiffening rings of suitable steel or iron "tees" or "angles" shall be placed around the exterior of the conduit pipe and be securely riveted thereto, at such points as the engineer will designate, where an unusual weight of any

kind is to be supported directly by the pipe, or where said pipe is to be rigidly anchored in masses of masonry placed in the trench. The dimensions and spacing of such rings, together with the number of rivets required in each, will be determined by the engineer from time to time as the occasion for their use arise.

Cutting out lateral openings.

212. Openings for the manholes and branches will be cut and rivet holes punched in the pipe shop, while the castings therefor may be riveted on in the field. All other openings for blow-offs, air valves, etc., must be cut out, and the necessary rivet holes punched and the riveting done in the field.

Caulking.

213. All riveted seams and joints of every description shall be thoroughly caulked, both on the inside and the outside of the pipe, in the best and most workmanlike manner for first-class boiler-work, while for the necessary distance from all laps the seams shall be both chipped and caulked. This provision applies also to all reinforcement plates or rings aforesaid. The caulking of all seams made in the shop must be done before the coating is applied to the pipe, and every precaution must be taken, both in the shop-work and the field-work, to insure the utmost strength and tightness.

Manner of payment.

Conduit pipe.

214. The cost of furnishing all appliances, materials and labor required for the manufacture of the pipe and special pieces, as aforesaid, except the castings and stiffening rings, must be included in the prices bid per lineal foot for the conduit pipe laid in place complete, said prices also to include the cost of riveting such castings and rings to the pipe or special pieces. Payment for the finished castings will be made at the price bid per pound for furnishing and putting in place

Cast-iron fittings.

all cast-iron fittings other than manholes, which are riveted to the said pipe, and payment for the stiffening rings will be made at the price bid per pound for furnishing and putting in place all required wrought-iron work, other than pipes.

Manholes.

Manholes will be paid for at the separate price bid for each complete.

Testing pipe in shop.

215. **Testing.**—During its manufacture, sample lengths of pipe, to be selected by the engineer as frequently as he may deem necessary, shall be tested before or after coating, under a water pressure equal to one and one-half ($1\frac{1}{2}$) times the maximum hydrostatic head for which it is designed, and shall be absolutely tight under that pressure.

All such tests will be made at the contractor's expense, and he shall furnish all the necessary appliances and labor for their performance to the engineer's satisfaction.

Coating.

216. **Coating.**—When the pipes are finished, they are to be thoroughly coated by dipping in a bath of refined asphaltum, or other approved material, as follows: Each length of pipe must be thoroughly clean inside and outside, free from dust, earth or sand, and without rust upon any part of it. Any rust that may have formed must be removed by brushing and scrubbing with a wire brush and diluted acid, followed by mopping or brushing with milk of lime, or a saturated solution of soda, to remove the acid, until all the rust and acid shall have been removed. All alkali used shall be washed off and the surface dried. The pipes are then to be heated in a suitable oven or by other approved methods to a temperature about 20° F. greater than that required for said bath, and while still at this temperature, they shall be dipped in the bath of coating material.

Cleaning and removing rust.

Heating before dipping.

Character of coating.

217. As to the composition of said coating material, it is the intention of these specifications to secure the best, most durable and most approved coating for the steel pipe and special pieces, which is available at the present time. To attain this end, a series of tests and experiments with different bituminous coating materials shall at once be made, under the direction of the engineer, by the contractor and at his expense. So far as

Experiments to be made by contractor.

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can now be determined the choice of suitable coating materials lies between a mixture of the coal-tar pitch varnish of Dr. R. Angus Smith in nearly equal proportions with refined Trinidad asphalt, and a varnish made of refined California asphalt, equal in quality to the best which is made for pipe-coating purposes by the "Oil Burning and Supply Company" of Los Angeles, California. A sufficient quantity of these and other similar substances, together with suitable apparatus for experimental purposes, shall be furnished by the contractor at his pipe shops, and proper specimen pieces shall be coated with said substances, separately and in various combination-, until a satisfactory mixture or material has been found, whereupon such mixture or material shall be adopted and applied in the best manner to all pipes and special pieces.

Qualities required in coating.

218. The coating must be durable, smooth, glossy, hard, tough, perfectly waterproof, not affected by any salts or acids found in the soil, free from bubbles or blisters, strongly adhesive to the metal under all circumstances, and with no tendency to become soft enough to flow when exposed to the sun in summer, or to become so brittle as to scale off in winter. As one test of the quality of the coating, a properly coated specimen plate will be plunged into a freezing mixture, and kept therein until the metal has acquired the temperature of said mixture, after which it shall be well hammered. If the coating remains tough and adhering closely to the metal, it will be considered proper, provided that it be satisfactory in all other respects.

Tank for coating.

219. After having been prepared as aforesaid, the coating composition shall be placed in a suitable tank and carefully heated to a temperature of about 300° F., or such other temperature as may hereafter be found best adapted for the purpose, and kept at this temperature during the whole time of dipping. The pipe must remain in the tank entirely immersed, and be kept constantly turning for a period of not less than twenty (20) minutes, or such longer time as experience may determine to be necessary. It will then be raised and the coating allowed to drain and dry or harden until well set.

Dipping.

Fresh materials to be added.

220. Fresh materials must be added to the aforesaid bath from time to time in the right proportions to keep the mixture of the proper consistency. Such proportions may also be varied according to the season of the year, as will be directed by said engineer, or found necessary to produce a coating of the required quality. The tank shall also be occasionally emptied of its contents and refilled with fresh material.

Tank to be emptied.

Changes in composition of coating.

221. It is also understood that the engineer shall have the right at any time to make, at the contractor's expense, any changes or alterations in the composition of the coating material, and in its mode of preparation and application to the metal, in order to more perfectly carry out the intention above expressed. Furthermore, if the coating of any pipe or special piece has not been properly applied and does not give satisfaction, whether from defective appliances, material or manipulation, or has been injured in transportation or otherwise, such pipe or special piece, wherever found, must at once be

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Defects in coating to be painted over by hand.

covered by hand, at the contractor's expense, with hot asphaltum, "P. & B." paint, paraffine paint, or other material, as may be selected by said engineer.

Cost of coating.

222. The cost of furnishing and applying the coating material and paint, as aforesaid, for all pipes and special pieces, must be included in the prices bid per lineal foot for the conduit pipe laid in place, complete.

Classification of castings.

223. **Cast-iron fittings and special castings.**—The necessary castings, other than manholes and ordinary straight water pipe, which may be required in the construction of the pipe conduit with its various branches, connections, overflows, blow-offs and air valves, also in the alteration or adaptation of the existing conduit and its branches at various points to the contemplated new conduit, will be divided for payment into two classes as follows:

"Fittings."

a. All castings, other than manholes, which are riveted to any course of the steel-pipe conduit, such as circular flanges, straight or beveled sockets and spigots, and lateral connection pieces of every description for branches, overflows, blow-offs and air valves. To avoid confusion with other material, all such castings will be designated as "fittings," or "fittings for the pipe conduit."

"Special castings."

b. All castings, other than ordinary straight water pipe, such as branches, reducers, sleeves, curves, bends, angle and wedge shaped pieces, which are not riveted to any course of said conduit, but which may be required at any points for insertion in the line of the steel-pipe conduit, instead of special riveted pieces or plate-work; also all such castings of every description, which may be required in the line of any connection, branch, overflow, blow-off or air-valve pipe, or in the line of the existing conduit and its branches at various points. For distinction from other material, all such castings will be designated as "special castings."

Designs for fittings and special castings.

224. If plans and drawings for said fittings and special castings are not furnished by the engineer, such plans or designs shall be furnished by the contractor without charge as the work advances, and shall be subject to said engineer's approval in every detail. In general, all special castings which may be inserted in the line of the contemplated steel conduit, must be provided with strong and properly faced and drilled flanges at the ends

Flanges and gaskets.

for connection, by means of suitable bolts and gaskets, with similar flanged fittings riveted to the adjoining ends of said steel pipe; and in the case of branches, all the openings thereof shall be provided with such flanges, except where some other mode of connection is specifically

Size and number of bolts.

253 required. The size and number of bolts in such flange joints in the line of the conduit will be determined on the basis that the aggregate tensile strength of the bolts shall be equal to that of the net plate section in the round seams of the pipe. The cast-iron fittings for the pipe conduit must also be provided with similar flanges, where some other mode of connections is not specifically required, and shall be securely riveted to the courses with intervening reinforcement rings or plates in all cases as aforesaid. The quality of the metal and workmanship used in the manufacture of all said material must also conform in every particular to the requirements for cast-iron work herein contained.

Reinforcement rings or plates.

Payment.

225. All of the above-described cast-iron fittings and special castings must be furnished, transported and properly set in place in the conduit by the contractor, and payment therefor will be made at the respective prices bid per pound for said two classes of castings complete, including all necessary pattern-making, machine-work, coating, hauling, fitting, setting, connecting, furnishing gaskets and other incidental work. The bolts required in making connections will be paid for at the price bid per pound for furnishing and putting in place all required wrought-iron work. The correct weight of every casting, when faced, drilled and finished, must be conspicuously painted on the outside in durable white figures; and the right of reweighing any or all such material at the contractor's expense is reserved to the executive board.

Size of manholes.

226. **Manholes.**—The contractor shall furnish and put in place in the steel-pipe conduit all required manholes, with covers, chains, bridge trees, gaskets and bolts complete in every respect. The openings for said manholes may be either circular, with a clear diameter of not less than sixteen (16) inches, or elliptical with clear major and minor diameters of not less than sixteen (16) and fourteen (14) inches respectively; and the joint between the frame and cover must in all cases be made by truly facing or milling the abutting surfaces, and interposing a suitable

gasket of sheet copper or lead. No portion of the frame or cover shall project within the cylindrical cross-section of the pipe, and the design of the manhole in all its details shall be subject to the approval of the engineer. If made of cast-iron, the quality of the metal and workmanship will be governed by the general specifications for castings herein contained.

Design.

227. Payment for all manholes ordered and put in place in conformity with the engineer's directions, will be made at the price bid for furnishing such manholes complete in all respects; but any manhole not so ordered, and which is put in place by the contractor at any time for his own convenience during the construction of the conduit, or for making any repairs thereto, and the replacement of gaskets in any manhole opened for any purpose by him, will be at said contractor's expense.

Payment.

254 228. **Hauling valves and other appliances.**—All check-valves, main and blow-off stop-valves, air valves, or other appliances, along with the fittings pertaining thereto, which are furnished by the executive board, will be delivered from the manufacturers at the nearest available railroad stations to the line of the conduit. The contractor shall promptly unload all such valves and other material from the railroad cars in or upon which they may have been transported to said stations, and all demurrage charges which may be made by the railroad company on account of delay on his part in unloading the same, must be borne by him alone.

Delivery of valves and appurtenances.

Demurrage charges.

229. The contractor must provide at his own expense, all such tools, timbers, ropes, derricks, chains, machinery and labor, as may be necessary for the safe and convenient handling of said valves and other material, and shall always use and operate the same in the unloading, loading, moving, manipulating and carting of the said materials in a manner satisfactory to the engineer. Any damage done to said materials in the process of unloading, inspecting or moving, will be charged to the contractor, and deducted from any moneys due to him on account of this contract.

Appliances and labor for handling.

230. The contractor shall thoroughly examine and inspect all such valves, etc., before and while unloading, and must promptly notify the engineer if any defective, injured or cracked pieces are discovered. In making such examination, he will be governed by special directions from

Inspection of valves and appurtenances.

the engineer, in addition to his own judgment, in forming his estimate of the soundness of all parts.

Responsibility for damage.

The contractor shall also become responsible for the soundness of all the pieces unloaded by him, except such as are so reported, and any loss or damage which may occur or be discovered thereafter, whether through accident or carelessness on his part or that of his employees, must be borne by him alone. The engineer will cause a similar inspection to be made at the same time, but such inspection shall not relieve the contractor from any responsibility or obligation on his part. In the operation of inspecting, unloading and loading the aforesaid pieces, the contractor shall afford the engineer every possible facility for determining the numbers, weights, and condition of said valves, etc.

Engineer's inspection.

Covered storage buildings.

231. The contractor must provide at his own expense, suitable covered buildings in the vicinity of said railroad stations and on the line of the works, for the storage of valves and other appurtenances of the conduit which are furnished by the executive board, and for the safety of which said contractor shall be responsible. The cost of all such storage must be included in the price bid per ton for hauling said valves, etc.

Defective pieces.

255 232. All radically defective pieces, and such as may have been injured during railway transportation to an extent which renders them unfit for use, shall be unloaded from the cars, if so directed by the engineer, and be stored for a reasonable period of time until a proper disposition of the material can be made by said engineer. On notice from said engineer such material shall be placed on cars and shipped to the points directed. For all said work of unloading, storing and reloading such unsuitable or rejected material, payment will be made at the price bid per net ton (2,000 lbs.) for hauling the same. When such material is not unloaded from the cars, no payment for examining and superintending the reshipment will be made.

Hauling and distributing valves, etc.

233. All said valves and other material which may be found acceptable and sound, shall be safely hauled, distributed and delivered by the contractor at the various points along the line of the conduit where such materials are required for use, in the manner hereinafter described for hauling the pipes and special castings which are furnished by the contractor. Wherever practicable, the correct weight of every valve, appliance or other material

Weights of pieces.

furnished by said board, will be painted conspicuously thereon in durable white figures; but in other cases or where said figures have become illegible, the correct weights must be ascertained at the contractor's cost, upon properly sealed scales, approved by the engineer, and be duly reported by the contractor to said engineer. The right of correctly reweighing any of said pieces is also reserved to the executive board, and the weights thus ascertained shall be adopted in making estimates. Payment for the above-described work of unloading, examining, weighing, storing, hauling and safely distributing said valves and other materials furnished by said board will be made at the price per net ton (2,000 lbs.) bid for hauling the same, such price to include all responsibility for damage done to said materials while in the contractor's charge.

Reweighing.

Payment.

234. **Setting valves and other appliances.**— The contractor shall set all said valves and other material carefully in place in their required positions in the conduit and its appurtenances, and also in any required alterations or adaptations of the existing conduit and its branches at various points, in full accordance with the directions of the engineer. In general, all valves or stop-gates are to be provided with properly faced and drilled flanges on each side for connection to the conduit-pipe fittings and special castings by means of suitable bolts and gaskets. On notice from the engineer, the contractor shall promptly furnish without charge, all necessary templets of said fittings and special castings to the manufacturers of said valves, in order that the same may be shaped and drilled to correspond; otherwise the flanges of said valves may be left unfinished, and all subsequent drilling and fitting thereof will be at the contractor's expense. All blow-offs are to be provided with two valves bolted together, and each air valve will be attached to a suitable stop-valve bolted upon the conduit.

Setting valves and appliances.

Flanges and gaskets.

Templets.

Blow-off valves and air valves.

Valves in conduit line.

235. The stop-valves to be inserted in the line of the contemplated steel conduit will all be thirty-six (36) inches in diameter, and may be set either vertically or horizontally upon suitable foundations, in accordance with the directions of the engineer. The valves will be provided with flanges, and the contractor must furnish and put in place all necessary reducers or taper pieces, equipped with corresponding flanges and gaskets,

Reducers and gaskets.

for connecting said valves with the larger steel pipe.

Payment.

236. Payment for all work involved in properly setting said valves in place, will be made at the prices bid therefor, complete, including all necessary fitting and gaskets; but in the case of blow-offs and air valves, it is understood that said prices shall include the setting of the aforesaid two valves and the stop-valve and air valve, respectively, said combined appurtenances being estimated only as single objects. If any masonry or timber-work for foundation, supports, vaults or enclosures of said valves and the fittings pertaining thereto is required at any locality, the same shall be furnished and put in place by the contractor in accordance with the engineer's directions, and separate payment therefor will be made at the prices bid per cubic yard for masonry, and per thousand feet B. M. for timber-work, of the respective classes of such work so performed. Separate payment for the bolts used in the said flange joints will also be made at the price bid per pound for furnishing and putting in place all required wrought-iron work.

Cast-iron pipe, where used.

237. **Cast-iron pipe.**—The pipe to be used for connecting the contemplated steel conduit with the existing conduit at various points and with the reservoirs, also for the overflows, may be of cast iron or riveted steel, as the executive board may elect; but for any alterations or adaptations of said existing conduit and its branches, as well as for all blow-offs and certain culverts in the contemplated work, cast-iron pipe of the required diameters will be used. All such pipe that may be required by the engineer of said board for any purpose or at any locality in said work, shall be furnished by the contractor, and shall conform accurately in shape, weight, dimensions and workmanship to the drawings or directions that may be given by said engineer from time to time.

Requirements.

Form and dimensions.

238. In general the pipe shall be of the usual kind known as "hub and spigot," and shall be about twelve feet in length from the bottom of the hub to the end of the spigot. The form and dimensions of the hub and spigot ends of all pipes and castings shall be subject to the approval of the engineer, when specific drawings therefor are not furnished by him. All the straight pipes shall be cast in dry sand moulds, vertically with the hub end down. Every pipe and special casting is to have the initials of

Manner of casting.

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the maker's name cast distinctly upon it, and its correct weight painted conspicuously on the outside, before delivery, with white-lead paint.

Quality of work.

239. The pipes and special castings shall be free from scoria, sand holes, air bubbles and other defects or imperfections; they shall be truly cylindrical in the bore; straight in the axis of the straight pipes, and true to the required curvature or form in the axis of the other pipes; they shall be internally of the full specified diameters, and shall have their inner and outer surfaces concentric. To insure proper diameters of sockets and spigots, a circular iron templet of the required dimensions shall be passed to the bottom of every socket, and a circular ring over every spigot. Care shall also be taken to avoid all excess in diameter of the sockets. No pipes or special castings will be accepted which are defective in joint room, whether in consequence of eccentricity of form or otherwise.

Inspection.

240. The quality of the metal and workmanship of said pipes and castings, together with the details of their cleaning, inspecting and hammer-testing shall be as set forth in the general specification for cast-iron work herein contained. After such cleaning and inspection, every pipe and special casting shall be heated in a suitable oven to a temperature of about 320° F. and, while at this temperature, be immersed in a bath of hot coal-tar pitch varnish, prepared in general according to Dr. R. Angus Smith's process. Special care shall be taken to have the surfaces of all pipes and castings entirely clean and free from rust immediately before putting them into said bath.

Coating.

Manner of coating.

241. Whilst any casting remains in said bath, the hot mixture must be kept thoroughly stirred by a frequent rolling, turning or churning motion of such casting, and on its removal from the tank, the coating shall *fume freely* for a short time, and set perfectly hard within one hour thereafter. Proper facilities for handling the castings, and allowing all surplus pitch to drip off, shall be provided by the contractor.

Testing by water pressure.

242. After the said coating has become thoroughly set and hard, every pipe shall be subjected to a proof by water pressure of from 200 to 300 pounds per square inch, according to its diameter and as will be determined by the engineer. Each pipe, while under the required pressure, shall be sharply rapped from end to end with a hand hammer, to ascertain whether any defects

have been overlooked; and any pipes which may exhibit any defects by leaking, sweating or otherwise, shall be rejected.

243. The cost of all required inspections and tests of the pipe and castings shall be borne by the contractor, except the salary of any inspector who may be appointed by the executive board. If required by the said board, the affidavit of the superintendent of the foundry, or that of the foreman employed by him to perform the above-described testing, shall also be furnished to the engineer from time to time; said affidavits to describe in detail the pipes and castings which were furnished, and to state that the same have been carefully tested at the foundry in accordance with these specifications, and that no defects were discovered or discoverable.

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Affidavit of foreman of foundry.

Weighing.

244. The pipes and castings will be weighed after the coating has been applied, and the contractor must furnish at his own expense, accurate and properly sealed scales, together with the necessary labor for the purpose. The executive board also reserves the right to reweigh on similar scales any special casting, and if any discrepancy be discovered between the weight marked upon said casting and that which was found on such reweighing, the latter weight will be adopted in the final settlement.

Reweighing.

Payment.

245. Payment for all material furnished in accordance with the foregoing requirements must be included in the price bid per pound for furnishing and setting special castings, and in the prices bid per lineal foot for furnishing and laying cast-iron water pipe, complete in all respects.

Handling and transporting steel pipe.

246. **Transporting and hauling the pipe and castings.**—The steel pipe, after being coated as above, is to be carefully loaded on wagons, trucks or cars with skids and blocking, so that the coating will not be chafed or rubbed off unnecessarily. At all points of contact the coating must be protected by rubber padding or other suitable material. Great care must also be taken in handling and unloading the pipe from cars and wagons wherever such operation may be required; and on reaching its destination, it shall always be lowered to the ground slowly over skids with ropes, and deposited if necessary on sacks filled with straw. Binding chains, where bearing on the pipe, must be covered with old rubber hose, or other soft and yielding material.

All damage done to the coating of said pipes and special pieces during transportation, must promptly be repaired at the contractor's expense, by thoroughly recoating the damaged places in such manner as the engineer will direct. Any pipe or special piece which has lost a considerable area of its coating, either in a single place or in the aggregate, will be rejected, unless recoated by complete immersion in a bath of the coating material, as above described.

Responsibility for damage.

Recoating.

Care must also be taken to prevent any deformation or indentation of the steel pipe and special pieces during transportation and delivery in the trench. Any pipe or special piece which exhibits an appreciable deformation at the time of laying will be rejected. All efforts of
259 the contractor to restore any damaged or deformed pipe or course to its proper shape by hammering, must be made in the pipe shop in a manner satisfactory to the engineer, and such pipe must be thoroughly recoated by dipping as aforesaid.

Deformation.

Recoating.

247. The contractor must provide at his own expense, ample storage room in the vicinity of any railroad station, or on the line of the works, where the steel and cast-iron pipes and specials may be delivered by him, and be detained for any reason. All material delivered at said stations shall be promptly unloaded, and any demurrage charges of such railroad company for delay in unloading cars must be borne by him. The necessary appliances, tools, teams, wagons and labor for properly unloading, reloading, hauling and handling said material at any locality must also be provided by said contractor.

Storage-room.

Demurrage.

Appliances and labor for handling and hauling.

248. A thorough inspection of all said material shall be made by the contractor upon its arrival at said railroad stations or storage grounds, and the condition of all pieces, together with the weights of all castings, received from time to time, shall promptly be reported in detail to the engineer. If the figures denoting the weight of any pipe or casting have been omitted or become defaced, or if the reweighing of any such piece is required by the engineer, said pieces shall be taken to and accurately weighed upon suitable and properly sealed scales furnished by said contractor, and their correct weight painted conspicuously upon the outside in white figures. No charge for such inspection or reweighing shall be made by the contractor.

Inspection.

Weights and reweighing.

Distribution of material.

249. The pipes and special pieces, after being carefully loaded upon the wagons, must be hauled to and properly distributed along the line of the conduit, as directed by the engineer. Due attention must be given to the matter of placing the pieces, in order that the joints may be properly made and that there may be no unnecessary turning or cutting of pipe for fitting specials, etc., nor occasion for unnecessary use of any sleeves or other specials.

Turning pipe.

250. The engineer will advise with the contractor in the matter of distributing the pipes and specials in the most advantageous manner for the proper prosecution of the work; but in default of any suggestions on the part of the contractor, the engineer will give directions as to the same. If, however, at any time afterwards or during the laying of the pipes, it shall appear that the position of the ends should be reversed, the contractor shall, at his own expense, turn the pipes end for end, as may be necessary, before depositing them in the trench, and the cost of such work must be included in the prices bid per lineal foot for furnishing and laying pipe, and per pound for furnishing and placing special castings.

Responsibility for damage.

260 251. All pipes and castings must be delivered in all respects sound and in conformity with these specifications, and the contractor shall be responsible for their soundness and condition at all times. In all inspections made by the engineer, the contractor shall afford said engineer all possible facilities for determining the weights and condition of said material, but no such inspection shall relieve said contractor from any responsibility or obligation on his part.

Payment.

252. The cost of all the above-mentioned work of transporting said material by railroad or otherwise, along with its unloading, reloading, inspection, reweighing, recoating and proper distribution, etc., must be included in the prices bid per lineal foot for furnishing and laying the steel and cast-iron pipes complete, and in the prices bid per pound for furnishing and setting in place all necessary cast-iron fittings and special castings.

Alignment and grade.

253. **Preparing trench for pipe-laying.**—The trench for the steel conduit and for all cast-iron pipes must be dug true to line and grade as given by the engineer, and of sufficient width to insure careful and proper placing of the pipe and special pieces therein. Where the bottom of the trench

Shape of bottom.

is firm and has been cut to the exact form of the pipe, no other support for the straight pipes will be required, provided that the said bottom is free from large stones and cut to the proper grade. If, in the same firm material, the trench has been excavated below the required grade, it may be refilled to the necessary level with selected material thoroughly consolidated by pounding or ramming. Under no circumstances shall stones be used to block up or adjust any pipe or special piece to line or grade, except as such stones are part of a regular masonry foundation constructed by direction of the engineer; and any rock, large stone or boulder which may be found in the bottom shall at once be removed, or cut down to at least six inches below the normal grade line at said point.

Refilling bottom.

Removal of rock and stones.

254. Particular care must at all times be taken to secure uniformity in character of foundation for all pipes and special pieces, with a firm and even bearing for their entire length, before any back-filling is done. Where the bottom of the trench is not evenly cut or dressed to the proper form, every pipe and special piece in the conduit shall be firmly supported and adjusted to the required alignment and grade by suitable plank or timber cradles, or concave wooden blocks, shaped to conform to the exterior of said pipe and give a bearing surface of not less than two (2) square feet therefor at each support. In general, such cradles or blocks shall be at least two (2) feet long and one (1) foot wide, said width to be measured in the direction of the axis of the pipe, and shall be at least three (3) inches thick at the middle and six (6) inches thick at the ends.

Uniform foundation.

Cradle or block supports.

Size of blocks for steel pipe.

261 They shall be of thoroughly sound oak or pine timber, and be placed ordinarily about ten (10) feet apart, and at shorter intervals wherever required by the engineer. Every block or cradle must be firmly bedded and adjusted exactly to the required grade and line before any pipe is laid thereon. The cost of all such blocks or cradles, and their setting, must be included in the prices bid per lineal foot for furnishing and laying the steel conduit pipe complete.

Spacing.

Bedding blocks.

255. In the case of cast-iron pipe and all special castings, the above-described support and adjustment will be done by at least two wooden blocks and four wooden wedges, which shall in general be placed near the ends of such pipes or castings. The blocks shall be of sound oak or pine timber, not less than twenty-four (24) inches long, two

Spacing and size of blocks and wedges for cast-iron pipe.

and one-half (2½) inches thick, and twelve (12) inches wide, for all pipes and castings more than twenty (20) inches in diameter; but when the diameter is twenty (20) inches or less, such blocks may be made eighteen (18) inches long, ten (10) inches wide and two (2) inches thick; the wedges shall be of sound pine timber, not less than nine (9) inches long, three (3) inches wide, and four (4) inches deep at the head. All blocks and wedges shall be evenly sawed instead of being split, and shall remain in place under the pipe during and after the refilling of the trench.

Bedding blocks.

256. The blocks for the cast-iron pipe and specials must all be bedded firmly and level upon and across the bottom of the trench, as aforesaid. If any block has been sunk too deep, so as to leave a space of more than one and one-half (1½) inches between the upper surface of the block and the lower side of said pipe or special casting when adjusted to the required grade, additional blocks shall be placed upon the one in question until the said space is reduced to within the specified limit. The pipes and castings may then be adjusted to the required grade, and securely held in position by means of the wedges. No filling up of the trench with earth will be allowed unless the same is thoroughly pounded and compacted underneath the pipe or casting. The cost of all necessary blocks and wedges must be included in the prices bid per lineal foot for laying the pipe complete.

Additional blocks.

Earth-filling.

Artificial foundations.

257. Wherever the bottom of the trench for the conduit or any other pipe is soft or unstable, the engineer may require an artificial foundation to be laid for the support of the pipes and specials. Such foundation may consist of gravel, broken stone, concrete, rubble masonry, plank, timber or piles according to local conditions. In all such cases the excavation will be continued to the required depth below the normal grade, and the foundation material shall then be put in place in accordance with the engineer's directions. If gravel or broken stone is used for this purpose, the same must be clean, free from sand, and conform, in general, to the require-

Excavation.

Gravel or broken stone.

262 ments for the ballast material of concrete, as herein specified; it shall be deposited in thin layers and be thoroughly rammed into the subsoil until the desired degree of consolidation has been obtained, and payment for said material will be made at the price bid per cubic yard therefor. If other materials are to be used

Payment.

for said foundation, they shall be furnished and put in place by the contractor in the best manner, and subject to the terms and conditions elsewhere herein expressed.

Excavation in rock.

258. Wherever the conduit trench is excavated through ledge rock or boulders, the bottom of the excavation must be made at least six (6) inches below the normal grade line, or bottom of the pipe, as aforesaid; and before the pipe is laid in such locality, said trench shall be refilled to the normal grade line with sand, gravel, or the finest selected earth material, which must be thoroughly compacted by ramming or pounding. The cost of such partial refilling must be included in the price bid per cubic yard for the rock excavation.

Refilling bottom of trench.

Pipe-laying to be pushed.

259. **Laying the steel conduit pipe.**—As soon as the trench for the length or distance directed by the engineer has been fully prepared for the reception of the conduit pipe and its appurtenances, as aforesaid, the laying of the said pipe shall be commenced and prosecuted with a sufficient number of men without delay. All pipes, cast-iron fittings, and special pieces and castings shall again be subjected to a thorough examination by the contractor, in addition to the ones previously made, and those which may now be found defective in any respect shall be rejected. The pipe may be riveted together on the bank in lengths of two or three sections, as may be found practicable and expedient. It shall then be carefully lowered into the trench with the longitudinal rivet seams on top, and the joints made. Joint holes must be of sufficient size to allow of proper workmanship in the riveting and caulking. After the rivets have been driven, the entire joint must be thoroughly caulked, and then coated with mineral, asphalt, paraffine, or "P. & B." paint, or hot asphaltum, as may be ordered by the engineer, said work to be done both on the outside and the inside of the pipe.

Final inspection of material.

Riveting sections together on bank.

Joint holes.

Caulking.

Painting.

Preserving original coating.

260. The utmost care must be used to preserve the original asphaltic coating intact, and wherever it has become injured in handling or otherwise, the pipe or special piece must immediately be painted as above described. Particular care shall be taken in all cases that the coating is perfect before any back-filling is performed. In order to more thoroughly insure the protection of the coating, strips of canvas or other suitable covering material, must be used on the inside and outside of the pipe while the men are at work, such cover-

Protection of coating.

ing to remain on the inside until all the riveting and painting is finished, and on the outside until the back-filling has been brought up to the level of the top of the pipe.

Cleaning pipe.

263 261. The pipes and their appurtenances shall all be thoroughly brushed out and cleansed, while they are being laid, from any dirt, earth, stones or rubbish which may have collected or found place on their interiors, either during or before the operations of delivery or laying. Suitable brushes for this purpose shall be provided by the contractor.

Placing special pieces and fittings.

262. All pipes, special pieces, fittings and castings of whatever character, shall, when set, conform to the positions, alignments and grades required by the engineer; and as the work proceeds, all of the required fittings and special riveted pieces or special castings, and other fixtures that are indicated upon the plan, or that may be required during the progress of the work, shall be introduced and set in their proper position. Particular attention must also be given to the manufacture and fitting of closing pieces, stiffening rings, etc., and the performance of other boiler-makers' work in the field. All bolts and gaskets required for flange joints shall be furnished by the contractor in accordance with the engineer's directions, and the cost of such gaskets of any description must be included in the prices bid per pound for cast-iron work.

Bolts and gaskets.

Omissions of special pieces, etc.

263. Any ommissions of the required special pieces or castings, stop-gates, or other fixtures intended to be laid, and indicated upon the plan for the pipe, or that may specially be ordered beforehand by the engineer, shall be corrected by the contractor without additional compensation; but in case any special piece or casting not indicated upon the said plan, or not distinctly required to be introduced beforehand by the engineer, is inserted into the pipe line after the latter has been laid, the expense of such insertions will be paid by the executive board.

Closing all lateral openings and ends of pipe.

264. The lateral openings in all special pieces or castings shall be securely closed with the coverings designed and provided therefor; and if no such covering is contemplated, the opening shall be closed temporarily by a suitable wooden plug until the proper valve or other appurtenance of the conduit is put in place thereon. In like manner, the open ends of the pipe laid in the trench shall always be closed securely with neatly fitting

plugs before leaving the work for the night, or during a storm or for any other reason. The expense of all such plugs must be included in the prices bid per lineal foot for furnishing and laying the pipe complete.

Appliances for the work.

265. All necessary tools and appliances for handling, drilling, punching, cutting, laying, caulking, repairing, painting and coating the pipe and special pieces or castings, of whatever description, shall be supplied by the contractor, said tools and appliances to include the furnaces, forges, kettles, ladles, fuel, jointing rings, clay and other material required in making hot-lead joints, where such are needed. Convenient derricks with strong and safe tackle, shall be used in handling
264 and lowering into the trench all pipes and appurtenances. The compensation for the expense or use of all tools or appliances of whatever description, applicable to said work, must be included in the prices bid per lineal foot for furnishing and laying the pipe complete.

Requirements.

266. **Laying cast-iron pipe.**—The foregoing requirements in regard to handling, inspecting, cleaning, placing and furnishing all necessary tools and appliances for the conduit pipe and special pieces, shall also be applicable to all cast-iron pipe and special castings that may be used in connections, overflows, blow-offs, or other appurtenances of said conduit, and in any part of the existing conduit or its branches.

Inspection and tests.

267. Upon their delivery at the proper localities in the work, the said pipe and castings shall be subjected to the hammer tests specified to be applied at the foundry; and all defective pipes or castings which may have passed the inspector at the foundry, or which may have been broken in transportation from the foundry to said localities, will be rejected when there discovered, unless the same may be cut as hereinafter provided. Care must also be taken in handling the pipes and castings not to injure the coating, and no material of any kind shall be placed in said pipes and castings during transportation, or at any time after being coated.

Protection of coating.

Defective pipe and castings.

268. If, upon its arrival at any of the designated localities, the spigot end of any straight pipe should be found cracked or broken, such defective portion will be cut off and a suitable wrought-iron fillet or bead shrunk on the new spigot end at the contractor's expense. No pipe or special casting in which the hub is found to be cracked or defect-

ive in any respect, will be accepted; nor will any special casting with a defective spigot end be received, or permitted to be cut off, without the written order of the engineer.

Cutting pipe.

269. Whenever it may be necessary to cut any straight pipe on account of some defect or accident to the same, or in order to bring the special castings or other fixtures into their required position, or for any other purpose, this cutting shall be done under the direction of the engineer by thoroughly skilled workmen with sharp and proper tools, in such manner as will not cause any cracking or breaking of the pipe longitudinally. Any damage done to a pipe by carelessness in cutting it, will be charged to the contractor.

Manner of cutting.

270. In cutting pipes, a groove cut with a pointed diamond-shaped chisel shall first be made around the circumference of said pipe, before the application of the cold-chisel; this groove to be not less than three-eighths ($\frac{3}{8}$) inch deep for pipes more than three-fourths ($\frac{3}{4}$) inch thick, and as much deeper as may be required. Every cut shall first be distinctly marked squarely across and around the pipe, and this mark must
265 then be carefully followed by the chisels.

In every case of uneven fracture, all inequalities on the cut or broken faces of the pipe shall be thoroughly trimmed off with cold-chisels, so as to furnish a smooth and even surface at right angles to the axis of the pipe, and satisfactory to the engineer. Wrought-iron bands or rings formed of half-oval iron, about three-fourths ($\frac{3}{4}$) inch wide and five-sixteenths ($\frac{5}{16}$) inch thick, shall be shrunk tightly around the spigot ends of all cut pipe.

Wrought-iron beads.

Surfaces of metal to be clean at pipe joints.

271. Particular care must be taken that the interior surfaces of the hubs and the exterior surfaces of the spigots shall be perfectly clean before the hemp packing is introduced; and the said surfaces shall furthermore be kept clean and free from dust, stones, earth and water, until the lead has been poured into the joints. If required by the engineer, the said surfaces of the hubs and spigots, when not cleaned in a satisfactory manner, shall be washed off with water, and then dried before they are put together.

Adjustment.

272. After the hubs and spigot ends of the pipes and castings have been thoroughly cleaned as specified above, the spigots shall be inserted into the hubs, so as to bring and leave the shoulder of the hub in close contact with the face of the spigot. The said spigot shall then be so adjusted in the

hubs by means of proper tools as to give an even and uniform space all around for the lead joint. No pipes or fixtures shall be laid, without the consent of the engineer, which will not afford a thickness of lead joint all around of at least one-fourth (¼) inch.

Joint-room for lead.

273. If the space of the lead joint should, in the opinion of the engineer, be too small or too large in any case to make a tight and secure joint, the pipe or casting which is defective in this respect, may be rejected and replaced by such as shall give the required joint-room; and if it should be found necessary for any reason to use a pipe or casting in which the said joint-room is as small as specified above, the engineer may require the joint on the interior of said pipe or casting to be closed up with clay, and the whole space between the spigot and the hub to be filled up with hot lead, thus making a "solid joint." No compensation for the labor and expense of removing any pipes or casting which are defective in joint-room, and replacing them by others which will give the required room, or of making solid lead joints, will be granted, said expense to be included in the prices bid per lineal foot for furnishing and laying the pipe, complete.

Solid joints.

Hemp packing for joints.

274. For packing the joints and preventing the melted lead from running into the interior of the pipes, hemp yarn of the best quality for the purpose shall be furnished and used by the contractor. A sufficient amount of this hemp shall be properly introduced and securely driven into the joints, so as to leave the required depth of lead joint all around. The compensation for this material, and for the labor of properly putting it in place according to the directions of the engineer, must be included in the prices bid per lineal foot for furnishing and laying the pipe complete.

266

Quality of lead for joints.

275. The lead for the joints shall be furnished by the contractor, and must be of the best quality, equal to the best refined Omaha lead. If the material furnished by the contractor is at any time improper or unsatisfactory to the engineer, it will be rejected, and the executive board reserves the right to immediately provide suitable lead at the contractor's expense by deducting the cost thereof from any moneys that may be due to said contractor on account of this work. The prices bid per lineal foot for furnishing and laying the pipe must include the cost of all neces-

sary lead, together with all waste and loss of same.

Running lead joints.

276. The lead shall be melted in suitable furnaces and kettles, and must be poured into the joints from hot ladles before any tendency to solidify or "set" shows itself. Each joint shall be run completely full at one operation, and there must be a head of at least one and one-half (1½) inches at the "gate." In case the ladle or vessel from which the melted lead is poured does not contain enough for this purpose, two or more filled ladles shall be provided for use at each joint, and shall be emptied into said joint in rapid succession so as to form a continuous stream of sufficiently large size. No second pouring of a joint which has been only partially filled at the first operation will in general be permitted; but if occasionally, for any reason, a portion of the lead has escaped either outside or inside the pipe, so as to leave any portion of the joint incompletely filled, such defective portion shall be thoroughly cut out in the most workmanlike manner and carefully run anew. All such work must, however, be subject to the engineer's approval; and when directed by him, the whole of any defective joint shall be properly cut or burned out, and made over at the contractor's expense. Suitable jointed iron rings or "clips" shall always be used in making the lead joints of pipes over twelve (12) inches in diameter; but for the smaller pipes, properly made clay rolls may be used. When the clay roll or ring is removed from any joint, the lead must show clean and continuous all around the pipe, and with no cold-shuts, air holes or imperfections of any kind.

Defective joints.

Clips and clay rolls.

Depth of lead joints.

277. The depth of the lead joints in pipes over sixteen (16) inches in diameter, which are connected with the conduit, shall not under any circumstances, be less than two and one-half (2½) inches all around, measured from the face of the hub, parallel with the pipe; but for smaller pipes and for all culvert pipes, such depth shall not be less than two (2) inches. Whenever it may be discovered that less than said amounts have been used, or when the lead joint from any reason is defective, the said joint shall be cut or burned out, and made anew, in accordance with these specifications.

Defective joints.

Quality of work.

278. The joints are all to be yarned and caulked by competent mechanics, and the caulking must be done in a faithful, efficient, and workmanlike

manner, so as to secure a tight joint without needlessly straining the iron of the pipes. Ample space must be provided in the trench by the contractor, to enable the caulkers to reach and caulk thoroughly all around the joint; and the cost of all additional excavation of the sides and bottom of the trench at the joints necessary for this purpose, together with the labor required in making the joints as specified above, must be included in the prices bid per lineal foot for furnishing and laying the pipe, complete.

Joint holes.

279. **Cleaning and testing the conduit and its appurtenances.**—After the pipes are properly laid and jointed in the trench, the inside is to be thoroughly inspected and cleaned out, and all debris of construction carefully removed at the contractor's expense. For this purpose, the entire length of pipe laid must be traversed and thoroughly examined by a competent and faithful employee of the contractor, accompanied by a similar agent of the executive board. Said inspectors shall certify to the exact condition of the interior of the pipe, and no payment will be made for any portion of the conduit which has not been so examined and found to be in full accord with these specifications.

Final inspection and cleaning.

Conduit must be traversed after laying.

Certificate of inspectors.

280. As soon as practicable thereafter and before being back-filled, the pipe shall be tested, at the contractor's expense, in convenient lengths of not less than 2,500 feet, to one and one-half ($1\frac{1}{2}$) times the ultimate static water pressure which will occur in such section, but in no case shall such test pressure be less than 50 lbs. per square inch. The contractor must furnish at his own expense suitable caps, plugs, flanges and all other fittings and appliances for closing and bracing the open end of the pipe. Where the main stop-gates have been properly set, no special plugs will be required; but in other places all such apparatus must be inserted, and removed after the test is completed, at the contractor's expense. During the test, all joints shall be carefully examined and properly caulked at all leaks and the pipe made tight. The contractor shall provide all necessary water and appliances for testing, without additional compensation beyond the prices bid per lineal foot for furnishing and laying the pipe.

Testing the conduit.

Closing open end and bracing.

Examination and caulking.

Provision of water and appliances for testing.

281. If, upon applying said test, any pipe, special piece, fitting or casting should break, burst or be found defective in any respect from

Defective pipes, fittings or castings.

any cause, the cost of all labor and materials required to properly replace the same with sound material in the line of pipe, and also all resulting damage to the trench and adjacent property, must be paid by the contractor without compensation.

Progress of work to be satisfactory.

268 282. **Order of work.**—The order of the work, especially as to the pipe-laying, shall be entirely under the direction and subject to the control of the engineer. The rate of progress is to be at all times satisfactory to said engineer, and must be such as will, in his judgment, insure the completion of the whole work within the time specified; and if such progress is not being made, the executive board may assume sole charge of the work on notice as hereinafter provided and complete the same at the contractor's expense.

Guarantee of work and materials for one year.

283. **Guarantee.**—The contractor must keep the conduit pipe and all its appurtenances, except stop-valves and air valves, in thorough repair and guarantee the city against all loss, cost or damage which may occur on account of any breakage or leakage, both during all the aforesaid tests and for a period of one year from the time of the final completion and acceptance of the conduit. He must promptly staunch all leaks and repair all damages thus occasioned, at his own cost and expense; or, if in the judgment of the engineer the emergency requires, the city may proceed to make all said repairs without notice to the contractor, and at his expense.

Payment for work and materials.

284. **Payment for furnishing and laying pipe.**—The prices bid per lineal foot for furnishing and laying the pipe of each class must include all of the various items and conditions mentioned in these specifications, viz: all materials and labor in the manufacture; all costs of inspection, transportation, cutting, fitting, riveting, bolting, laying, caulking, testing and maintaining, as aforesaid; all cradles, blocks, wedges, lead, yarn, gaskets, asphalt, paint, fuel and other necessary materials; and the use of all tools, implements and appliances required in the complete performance of the work indicated. Measurement for payment will be made along the top of the pipe when laid, tested, and completed, as aforesaid; but the length of all special castings and valves inserted in the line of such pipes will be deducted. In the case of the steel conduit pipe, no deduction will be made for the length along the axis of said pipe occupied by flanges or other fittings less than

Measurement of pipe.

one (1) foot long; but no allowance will be made for the length of any fittings riveted to the sides of said pipe.

Special castings.

285. The price bid per pound for furnishing and putting in place all special castings in the line of the steel conduit or any other pipe, must include the cost of all the items of work enumerated in the preceding paragraph; and the price bid per pound for furnishing and putting in place all cast-iron fittings for the steel conduit must also include the cost of all said items of work.

Cast iron fittings.

269 **Miscellaneous Items.**

Wrought-iron work.

286. **Wrought-iron work.**—Wrought iron will be used for bolts, pins, manhole steps, ladders, guides, beams, brackets, hangers, spikes, nails, anchor and stiffening rings for the steel pipes, etc., in a variety of places and structures throughout the work. It must be of the best quality of American refined iron, tough, ductile, and having a tensile strength of not less than 50,000 pounds per square inch, with an elastic limit of at least 25,000 pounds per square inch.

Quality.

287. The wrought-iron work of every description must conform closely to the required dimensions and be set in place in the best and most workmanlike manner. Payment for all such material furnished by the contractor will be made at the price bid per pound for the finished work put permanently in place, said price to include all necessary machine-work, forging, pattern-making, fitting, painting, weighing, transportation and labor, and with no allowance for loss or waste. The correct weight of every piece of such iron-work weighing more than fifty (50) pounds must be conspicuously painted on the outside thereof, with durable white-lead paint, at the contractor's expense. The executive board also reserves the right to reweigh all such iron-work.

Cast-iron work.

288. **Cast-iron work.**—Cast iron will be used for beams, braces, stop-plank grooves, channels, weir plates, guides, manhole curbings and covers, rectangular or circular pipes or water passages, platforms, etc., in structures, valve boxes and other objects, also for various fittings for the steel-pipe conduit and special castings. It shall be made from the best quality of tough, grey metal, without admixture of cinder iron or other inferior grades of iron, and treated in such manner as to

Quality.

produce castings which shall be strong, tough, sound and even in grain, free from uncombined carbon when examined under the microscope, and soft enough to satisfactorily bear drilling, chipping and cutting. Specimen rods of the metal used, each being twenty-six (26) inches long, two (2) inches wide, and one (1) inch thick, shall be made without charge as often as the engineer may direct, and shall be tested, at the contractor's expense, both for transverse strength and deflection, by placing them horizontally and flatwise upon supports twenty-four (24) inches apart, and then applying a steadily increasing load at the middle of each bar. The quality of the metal used must be such that said bars shall each carry a center load of not less than two thousand (2,000) pounds before breaking, and exhibit a deflection of not less than three-eighths ($\frac{3}{8}$) of an inch. In estimating the suitability of the metal from said tests, the average of the three highest results obtained from each set of four bars will be considered as representing the actual strength of the iron.

Test specimens.

Test load.

Furnishing test-bars.

270 289. At least one set of four test-bars shall be made and tested as described, on each working day during the manufacture of the large pieces. These test-bars must be poured from the ladle either before or after any particular castings are poured, and must present true samples of the iron used in said castings; they shall be cast from regular patterns in green sand, and as nearly as possible to the required dimensions without being finished up; proper corrections will, however, be made in the results for slight variations of width and thickness. Records shall be kept of the tests of all bars made, and a duly certified copy of such records shall be forwarded to the engineer.

Records of tests.

Quality of castings.

290. The castings shall be free from scoria, sand holes, air bubbles and other defects or imperfections, and must conform in weight and thickness to the drawings and directions to be furnished by the engineer. No allowance will be made for making or altering any patterns required for said castings, and the cost of all such work must be included in the price bid per pound for the finished piece. None of the castings shall be stripped while still showing any color of heat, but shall be left in the flasks for a sufficient length of time to prevent unequal cooling and contraction by subsequent exposure. On being removed from the

Pattern-making.

Treatment of castings.

flasks, they shall be subjected to a careful examination and hammer test for the purpose of detecting imperfections of any kind. They shall then be thoroughly dressed and made clear and free from earth, sand or dust, which adheres to the iron in the moulds; iron-wire brushes must be used, as well as softer brushes to remove the loose dust. No acid shall be used in cleaning the castings. No lump or rough places shall be left on any surface and no plugging or filling will be allowed. After being properly dressed and cleaned, they shall again be subjected to a thorough inspection and hammer test. The contractor will be required at the foundry to place all castings in such positions as may be deemed necessary for convenience of inspection, and the engineer may reject, without proving, any casting which is not in conformity with the specifications or the drawings furnished.

Cleaning of castings.

Inspection and testing of castings.

291. After its inspection and while free from rust, moisture, dirt, dust, sand or other improper matter, all of the wrought and cast iron work shall be thoroughly coated, by dipping or brushing, with at least two good coats of asphalt paint, of such quality as the engineer will direct. This coating shall be applied at the places of manufacture of said work, and in case that it has become defective or worn off in transportation or otherwise, it shall be carefully renewed before the metal is imbedded or built into any masonry. All of the iron-work which is left exposed in any structure, shall also be thoroughly cleaned and freed from mortar, dirt or other debris of construction, and thickly recoated with said paint on the completion of the work at any locality.

Painting or coating of iron-work.

Renewal of coating and cleaning.

271 292. All castings shall be accurately weighed for payment after all necessary cleaning, dressing, coating and machine-work thereon has been completed, and properly certified copies of such weighings shall be furnished to the engineer from time to time. The correct weight of every casting which weighs more than fifty (50) pounds, must also be conspicuously painted on the outside thereof with durable white-lead paint; and if the figures representing such weight should become erased or defaced from any cause, the casting shall be reweighed. The executive board also reserves the right to reweigh any such casting at any time; and if any discrepancy be discovered between the weight marked upon said casting and that which may be found on reweigh-

ing, the latter weight will be adopted. The necessary scales for weighing, together with all labor required for the purposes aforesaid, must be furnished at the contractor's expense.

Conditions.

293. The cast-iron work of every description must conform closely to the required dimensions and be set in place in the best and most workmanlike manner.

Payment.

Payment for all such material furnished by the contractor will be made at the price bid per pound for the finished work in place, said price to include all necessary machine-work, pattern-making, testing, fitting, painting, weighing, transportation and labor, and with no allowance for loss or waste.

Removal of rubbish and tools, etc.

294. **Clearing.**—As the work progresses, all rubbish, refuse, unused materials, tools and appliances shall be removed promptly from the ground at the contractor's expense. Whenever this clearing of such matter, and the repair of public and private roads, fences or other damages, done by the contractor in the construction of the conduit and its appurtenances, are neglected, the engineer will give notice to that effect to the contractor; and if said matter be not removed or the required repairs be not made within five days thereafter, or such other time as the engineer may direct, or if the contractor does not at once take the necessary precautions to insure safety of travel, the engineer may employ other parties to do such work, and the expense thus incurred shall be deducted from any moneys due, or that may become due, to the contractor.

Must be done promptly.

Quality.

295. **General relating to materials and workmen.**—All materials and workmanship furnished by the contractor shall be of the first quality of their kind. The same will be subject to rigid inspection and must be entirely satisfactory to the engineer.

Inspection.

Rejected material.

Any material that has been rejected or condemned, shall immediately be removed from the site of the works, failing which such material may be conspicuously marked as rejected, with paint or otherwise, by the engineer or inspector, and removed at the contractor's expense.

Responsibility for improper work.

The presence of any engineer or inspector at the time that any improper material is being put in place, or improper workmanship is being performed, shall in no way be presumed to release, in any degree, the responsibility of the contractor or his obligations.

Skilled workmen.

296. The contractor further agrees that he will employ only competent and skilled workmen to

do the work, and that whenever said chief engineer shall inform said contractor in writing that any person on the work, is, in his opinion, incompetent and unfaithful, quarrelsome or disorderly, such person shall be discharged by said contractor and shall not be again employed on said work. A sufficient number of experienced superintendents or foremen must also be employed to represent the contractor at different parts of the work, and they shall receive and obey directions or orders from the engineer.

Improper workmen.

Superintendents and foremen.

297. When explosives are introduced into the locality of the conduit, the contractor must provide suitably isolated and safe storage places therefor, and only skillful and trustworthy workmen shall be employed in the handling and use thereof, or have access thereto. Caps and other exploders shall not be stored in the same place in which dynamite or other explosives are stored.

Storage of explosives.

298. The contractor will not be permitted, either by himself or by any of his agents or employees, to give or sell any ardent or intoxicating liquors or spirits to his workmen, or any other persons, at or near the line of the conduit, nor allow any such spirits to be brought on the works by said employees or other persons; and he will be required, at all times, to exercise his whole power and influence to discountenance and prevent the use of such spirits in any way by persons in his employ or under his control. He shall also exercise his influence and authority to the utmost extent to maintain at all times an orderly conduct among said employees, and shall spare no effort or expense in promptly quelling any disturbance, quarrel or riot that may break out among them, or between the same and any other persons.

Intoxicating liquors.

Orderly conduct.

299. The contractor shall at all times exercise the utmost vigilance to prevent any of the bricks, stones and other materials used in the work from being soiled or polluted by excrements or other offensive matter, also to prevent the deposit of any excrements or offal of any character anywhere within the conduit and its appurtenances. As one safeguard against such pollution, he shall provide and properly maintain, under the direction of the engineer, all appliances and receptacles for said excrements and offal that may be necessary on any part of the work; and where any part of the conduit and its appurtenances may have become soiled by such matter, accidentally or otherwise, such place shall at once be thoroughly

Materials to be kept free from pollution.

cleaned and disinfected as the engineer will direct, failing which the engineer will cause said cleaning and disinfection to be done by other parties at the contractor's expense, and will deduct the costs thus incurred from any moneys due to said contractor on account of the work. Any employee of the contractor who shall be known to commit a nuisance in said conduit and its appurtenances, or to pollute any material used in the construction thereof, shall immediately be discharged.

Disinfection of polluted materials.

273

Observation of local ordinances.

300. In every operation connected with the work herein specified, all general or local ordinances and laws, controlling or limiting in any way the action of the contractor or his employees engaged on said work, or affecting the materials applied or used in the construction thereof, must be respected and strictly observed.

FURTHER AGREEMENTS.

301. **Commencement and termination of work.**—Said contractor shall begin work within ten (10) days after the execution and delivery of this contract, and he shall progress therewith so that the whole shall be completed on or before the day of , 189 .

302. **Prices and payments.**—Said city hereby agrees to pay, and said contractor hereby agrees to receive, the following prices in full compensation for furnishing all materials, not herein specifically excepted, which may be required in the aforesaid work, and for the delivery of the same; also, for furnishing all labor required in the execution of all the work contemplated in this contract; also, for furnishing all necessary and proper machinery, tools, appliances, power, etc.; also, for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same; also, for all risks of every description connected with the work; also, for all expenses and damages incurred by or in consequence of the suspension or discontinuance of said work, as hereinafter specified; and for well and faithfully completing the same and the whole thereof, in the manner and according to the plans and specifications, and the requirements of the engineer under them, to wit: For furnishing materials and for manufacturing and laying a riveted steel pipe conduit inches in diameter and constructing all the required appurtenances thereto, commencing at the north end of the contemplated masonry conduit, near Hemlock lake, Livingston Co., N. Y., and terminating at Mt. Hope reservoir, in the city of Rochester, N. Y.

PRICES.

a. For all **grubbing and clearing,** including all incidental work, the sum of.....($.....)
per acre of surface actually cleared.

274 *b.* For all **earth excavation in roadway grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **permanent new channels for water-courses** carried **over** the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, bailing and draining, and all incidental work, the sum of.....
.....($.....) per cubic yard.

c. For all **rock excavation in roadway grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **permanent new channels for water-courses** carried **over** the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, bailing and draining, and all incidental work, the sum of.....
.....($.....) per cubic yard.

d. For all **earth excavation in open trenches or pits,** for the masonry and pipe conduit, entrance and overflow chambers, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and sheeting, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, bailing and draining, and all incidental work, the sum of.....
.....($.....) per cubic yard.

e. For all **rock excavation in open trenches or pits,** for the masonry and pipe conduit, entrance and overflow chambers, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and shoring, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, bailing and draining, and all incidental work, the sum of.....
.....($.....) per cubic yard.

f. For all **earth excavation in shafts** for tunnel, including all necessary bracing, timbering, back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping, bailing and draining, and all incidental work, the sum of.....
.....($.....) per cubic yard.

275 *g.* For all **rock excavation in shafts** for tunnel, including all necessary bracing, timbering, back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping, bailing and draining, and all incidental work, the sum of.. ....($.....) per cubic yard.

h. For all **earth excavation in tunnel,** including all necessary bracing, timbering, lighting, ventilating, removal and back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping, bailing and draining, and all incidental work, the sum of..... ....($.....) per cubic yard.

i. For all **rock excavation in tunnel,** including all necessary bracing, timbering, lighting, ventilating, removal and back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, pumping, bailing and draining, and all incidental work, the sum of..... .....($.....) per cubic yard.

j. For **hauling more than 1,000 feet** any excavated material from sides of open excavations, or from ends of tunnel or tops of shafts, including making and grading of embankments and spoil banks, and all incidental work, the sum of..... ($.....) per cubic yard, measured in excavation, for each additional one hundred feet hauled, or fraction thereof greater than fifty feet.

k. For all **concrete masonry** mixed in the proportion of one part **natural cement,** two parts sand and five parts ballast, deposited and rammed in place in foundations, backing and walls of the entrance and overflow chambers, masonry and pipe conduit, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, culverts and other structures, built **in open excavation,** including furnishing, placing and removing all moulds and forms, and all incidental work, the sum of..... .....($.....) per cubic yard.

l. For all **concrete masonry** mixed in the proportion of one part **Portland cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations, backing and walls of the entrance and overflow chambers, masonry and pipe conduit, gate vaults, blow offs, pipe overflows, bridges, railroad crossings, creek crossings, culverts, and other structures, built **in open excavation,** including furnishing, placing and removing all moulds and forms, and all incidental work, the sum of..... ....($..... ..) per cubic yard.

276 *m.* For all **concrete masonry** mixed in the proportion of one part **natural cement,** two parts sand and five parts ballast, deposited and rammed in place in foundations and backing of lining masonry built **in the tunnel and shafts,** including furnishing, placing and

removing all moulds and forms, and all incidental work, the sum of..... .....($ ....) per cubic yard.

n. For all **concrete masonry** mixed in the proportion of one part **Portland cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations and backing of lining masonry built **in the tunnel and shafts,** including furnishing, placing and removing all moulds and forms, and all incidental work, the sum of ... .($.....) per cubic yard.

o. For all **brick masonry laid with natural cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in foundations and walls of entrance and overflow chambers, conduit, gate vaults, pipe overflows, culverts and other structures, built in open excavations,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, cleaning, pointing, applying cement wash, and all incidental work, the sum of.....($.....) per cubic yard.

p. For all **brick masonry laid with Portland cement** mortar, mixed in the proportion of two parts sand to one part cement, **in foundations and walls of entrance and overflow chambers, conduit, gate vaults, pipe overflows, culverts and other structures, built in open excavations,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, cleaning, pointing, applying cement wash, and all incidental work, the sum of..... .. .. ($... .....) per cubic yard.

q. For all **brick masonry laid with natural cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in the tunnel and shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of..... ....($..... ..) per cubic yard.

r. For all **brick masonry laid with Portland cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the tunnel and shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning,
277 pointing, applying cement wash, and all incidental work, the sum of..... ....($... .....) per cubic yard.

s. For all **cut-stone masonry and copings** laid with Portland cement mortar, mixed in the proportion of two and one-half parts sand to one part cement, in entrance and overflow chambers, shafts, manholes, bridges, railroad crossings, gate vaults and other structures, including cleaning, pointing, and all incidental work, the sum of..... .....($.....) per cubic yard

t. For all **second-class stone masonry laid with natural cement** mortar, mixed in the proportion of two parts sand to one part cement, for such portions of bridge abutments and piers, and railroad crossings, as project above the surface of the ground, including furnishing, placing and removing staging, cleaning, pointing, and all incidental work, the sum of.....
.....($.....) per cubic yard.

u. For all **second-class stone masonry laid with Portland cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, for such portions of bridge abutments and piers, and railroad crossings, as project above the surface of the ground, including furnishing, placing and removing staging, cleaning, pointing, and all incidental work, the sum of.....
....($.....) per cubic yard.

v. For all **third-class stone masonry laid with natural cement** mortar, mixed in the proportion of two parts sand to one part cement, for bridge abutments and piers, railroad crossings, culverts, foundations of second-class stone masonry below the surface of the ground, and other structures, including furnishing, placing and removing staging, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of.....
.....($.....) per cubic yard.

w. For all **third-class stone masonry laid with Portland cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, for bridge abutments and piers, railroad crossings. culverts, foundations of second-class masonry below the surface of the ground, and other structures, including furnishing, placing and removing staging, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of.....
..... ($.....) per cubic yard.

278 *x.* For all **fourth-class or common rubble masonry laid with natural cement** mortar, mixed in the proportion of two parts sand to one part cement for foundations, backing and walls of the entrance and overflow chambers, masonry and pipe conduit, manholes, gate vaults, pipe overflows, blow-offs, creek crossings, culverts and other structures **built in open excavations,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of..... .....
.....($.....) per cubic yard.

y. For all **fourth-class or common rubble masonry laid with Portland cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement for foundations, backing and walls of the entrance and overflow chambers, masonry and pipe conduit, manholes, gate

vaults, pipe overflows, blow-offs, creek crossings, culverts and other structures, **built in open excavations,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of. ....
.....($.....) per cubic yard.

z. For all **fourth-class or common rubble masonry laid with Portland cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, **in the tunnel and shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, pumping, bailing and draining, and all incidental work, the sum of.....
....($.....) per cubic yard.

aa. For all **screened gravel** deposited in foundations of the entrance and overflow chambers, masonry and pipe conduit, gate vaults, pipe overflows, blow-offs, railroad crossings, creek crossings, culverts and other structures, built in open excavations, including ramming in place, and all incidental work, the sum of.....
.....($.....) per cubic yard.

bb. For all **broken stone** deposited in foundations of the enterance and overflow chambers, masonry and pipe conduit, gate vaults, pipe overflows, blow-offs, railroad crossings, creek crossings, culverts and other structures, built in open
279 excavations, including ramming in place, and all incidental work, the sum of..... ....
.....($.....) per cubic yard.

cc. For all **slope wall** laid dry for protecting the sides of earthen embankments, excavations, and channels of water-courses, including all incidental work, the sum of..... .....
....($.....) per cubic yard.

dd. For all **stone paving** laid for protecting the sides of earthen embankments and excavations, the channels of water-courses, and the bottoms of culverts, including all incidental work, the sum of..... ... .
.... ($... .....) per cubic yard.

ee. For all **riprap** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of..... ..
... .($.....) per cubic yard.

ff. For all **brush and stone** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of
.....($.....) per cubic yard.

gg. For all **36-inch cast-iron water pipe** for connections at reservoirs and elsewhere, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of.. ....
....($.....) per lineal foot.

hh. For all **30-inch cast-iron water pipe** for connections at reservoirs and elsewhere, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of..... .....($.... ...) per lineal foot.

ii. For all **24-inch cast-iron water pipe** for culverts, overflows and connections at reservoirs and elsewhere, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of..... .....($.....) per lineal foot.

280 *jj.* For all **20-inch cast-iron water pipe** for culverts and overflows, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of... .....($..... ...) per lineal foot.

kk. For all **16-inch cast-iron water pipe** for culverts and overflows, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of ... ...($..... ..) per lineal foot.

ll. For all **12-inch cast-iron water pipe** for culverts, overflows and blow-offs, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of ....($.....) per lineal foot.

mm. For all **10-inch cast-iron water pipe** for blow offs, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of..... ....($.....) per lineal foot.

nn. For all **8-inch cast-iron water pipe** for blow-offs, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of..... ....($.....) per lineal foot.

oo. For all **6-inch cast-iron water pipe** for blow offs, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of..... ... ...($.....) per lineal foot.

pp. For all **20-inch vitrified earthenware pipe** for culverts, furnished and laid with Portland cement joints, complete in every respect, including all incidental work, the sum of .....($.....) per lineal foot.

qq. For all **18-inch vitrified earthenware pipe** for culverts, furnished and laid with Portland cement joints, complete in every respect, including all incidental work, the sum of ....($..... ..) per lineal foot.

281 *rr.* For all **15-inch vitrified earthenware pipe** for culverts, furnished and laid with Portland cement joints, complete in every respect, including all incidental work, the sum of..... ....($.....) per lineal foot.

ss. For all **12-inch vitrified earthenware pipe** for culverts furnished and laid with Portland cement joints, complete

in every respect, including all incidental work, the sum of .....(§.....) per lineal foot.

tt. For all **8-inch heavy wrought-iron well tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of.....(§.....) per lineal foot.

uu. For all **7-inch heavy wrought-iron well tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of.....(§.....) per lineal foot.

vv. For all **6-inch heavy wrought-iron well tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of.....(§.....) per lineal foot.

ww. For all **tunnel ventilation holes 8 inches in diameter,** drilled through ledge rock from the bottom of the eight-inch tubing to the top of the tunnel, including all incidental work, the sum of.....(§.....) per lineal foot.

xx. For all **tunnel ventilation holes 7 inches in diameter,** drilled through ledge rock, from the bottom of the seven-inch tubing to the top of the tunnel, including all incidental work, the sum of.....(§.....) per lineal foot.

yy. For all **tunnel ventilation holes 6 inches in diameter,** drilled through ledge rock, from the bottom of the six-inch tubing to the top of the tunnel, including all incidental work, the sum of.....(§.....) per lineal foot.

282 *zz.* For all **timber piles** furnished, driven and left in place in foundations for entrance and overflow chambers, masonry and pipe conduit, bridge abutments and piers, railroad crossings, creek crossings, gate vaults, pipes, overflows, blow-offs, culverts and other structures, including all incidental work, the sum of.....(§.....) per lineal foot.

aaa. For all **timber piles** furnished, driven and left in place in bents and trestle-work for supporting wooden roadway bridges and approaches thereto, at creek crossings where the pipe conduit is carried under the channel, including all incidental work, the sum of.....(§.....) per lineal foot.

bbb. For all **timber and plank** furnished and put permanently in place in foundations of entrance and overflow chambers, masonry and pipe conduit, bridge abutments and piers, railroad crossings, creek crossings, gate vaults, pipe overflows, blow-offs, culverts and other similar structures, including all incidental work, the sum of.....(§.....) per thousand feet, B. M.

ccc. For all **timber and plank** furnished and put permanently in place in the floors and approaches of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel, including all incidental work, the sum of . ...($.....) per thousand feet, B. M.

ddd. For all **white-pine timber** furnished and put permanently in place in trusses of wooden roadway bridges, at creek crossings where the pipe conduit is carried under the channel; and for all **white-oak plank** matched and planed, for casings around the pipe conduit where said pipe is carried over the channel upon permanent iron bridges, including painting and all incidental work, the sum of..... ....($..... ...) per thousand feet, B. M.

eee. For all **wrought-iron work** such as beams, bolts, rods, ties, steps, straps, hangers, spikes, nails, etc., furnished and put permanently in place wherever required in wooden roadway bridges, casing for pipe conduit on iron bridges, in the masonry or foundations of the entrance and overflow chambers, shafts, manholes, bridge abutments and piers, railroad crossings, creek crossings, gate vaults, pipe overflows, blow-offs, culverts and other structures, also in flanged joints for stop-gates, special castings, blow-offs,
285 ir valves and stiffening and anchor rings for the pipe conduit, including coating and all incidental work, the sum of..... ....($.....) per pound.

fff. For all **cast-iron work** such as beams, braces, saddles. gate vault curbs and covers, washers, etc, furnished and put permanently in place wherever required in any masonry or foundation of the entrance and overflow chambers, shafts, manholes, abutments, or in wooden roadway bridges, railroad crossings, creek crossings, gate vaults, pipe overflows and other structures; also for all castings or **"fittings,"** other than manholes, which are riveted to any course of the steel-pipe conduit; also for all boxes and covers for valves of every description pertaining to said conduit; including all necessary pattern-making machine work, coating, hauling, fitting, setting, connecting, furnishing and placing gaskets, and all incidental work, the sum of..... ....($.....) per pound.

ggg. For all **"special castings,"** such as branches, reducers, sleeves, curves, bends, angle and wedge-shaped pieces, which are not riveted to any course of the steel-pipe conduit, but which may be substituted for similar riveted special pieces in the line of said conduit; also for all such castings of every description which may be required in the line of any branch or appurtenance of said conduit, or in the line of the existing conduit and its branches at various points; including all necessary pattern-making,

machine-work, coating, hauling, fitting, setting, connecting, making hot-lead joints in case of sockets, and furnishing and placing gaskets in case of flange joints, and all incidental work, the sum of..... .....
... .($..... ...) per pound.

hhh. For each **manhole** furnished and formed in the steel-pipe conduit, with covers, chains, bridge trees, gaskets and bolts, complete in every respect, including all necessary pattern-making, machine-work, coating, hauling, fitting, setting, connecting, furnishing and placing gaskets, and all incidental work, the sum of..... .....
... .($.....) for each manhole.

iii. For setting each **36-inch stop-valve** and appurtenances thereto in place in line of the pipe conduit, or for reservoir or other connections, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of ....
....($ .....) for each valve.

284 *jjj.* For setting each **30-inch stop-valve** and appurtenances thereto in place for any required or contemplated connection with reservoirs or the existing or any future conduit, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..
.....($..... ....) for each valve.

kkk. For setting each **24-inch stop-valve** and appurtenances thereto, in place in any required alteration or adaptation of the existing conduit and its branches, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..... . .....
....($.....) for each valve.

lll. For setting each pair of **12-inch blow-off valves** and appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of... ....
... .($.....) for each blow-off.

mmm. For setting each pair of **10-inch blow-off valves** and the appurtenances thereto in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..... .....
....($.....) for each blow-off.

nnn. For setting each combined **8-inch air valve or pair of blow-off valves** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..... ....
... .($.....) for each air valve or blow-off.

ooo. For setting each combined **6-inch air valve or pair of blow-off valves** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..... ....
.....($.....) for each air valve or blow-off.

ppp. For setting each combined **5-inch air valve** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..... .....(\$.....) for each air valve.

285 *qqq.* For setting each combined **4-inch air valve** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..... .....(\$.....) for each air valve.

rrr. For setting each combined **3-inch air valve** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..... .... (\$.....) for each air valve.

sss. For setting each combined **2-inch air valve,** and the appurtenances thereto, in the required position, including all necessary fitting, furnishing and placing gaskets, and all incidental work, the sum of..... ... .(\$.....) for each air valve.

ttt. For **hauling all stop-valves, blow-off valves and air valves,** with the special fittings appertaining thereto, from their point of delivery by the executive board to their proper destination in the work, including handling, inspecting, storing, weighing, guaranteeing same against damage, and all incidental work, the sum of ....(\$.....) per net ton (2,000 lbs.).

uuu. For all **cofferdamming, pumping, bailing and draining** involved at each place where the pipe conduit may be laid under the channel of Hemlock Lake outlet or Honeoye creek, including removal of all cofferdams, piles, sheetings, or other obstructions, and all labor or damage caused by unforeseen contingencies, and all incidental work, the gross sum of.... .... (\$.....) for each crossing.

vvv. For all **38-inch single-riveted steel conduit pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of..... ....(\$.....) per lineal foot.

www. For all **38-inch double-riveted steel conduit pipe** and special pieces, one-fourth (¼) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of .....(\$.....) per lineal foot.

xxx. For all **38-inch double-riveted steel conduit pipe** and special pieces, five-sixteenths ($\frac{5}{16}$) inch in thickness,

286 furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping

in repair for twelve months, and all incidental work, the sum of .... ($.....) per lineal foot.

yyy. For all **38-inch double-riveted steel conduit pipe** and special pieces, three-eighths ($\frac{3}{8}$) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of .... ($.....) per lineal foot.

Alternate to items *vvv*, *www*, *xxx*, and *yyy*.

zzz. For all **40-inch single-riveted steel conduit pipe** and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of .... ($.....) per lineal foot.

aaaa. For all **40-inch double-riveted steel conduit pipe** and special pieces, one-fourth ($\frac{1}{4}$) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of .... ($.....) per lineal foot.

bbbb. For all **40-inch double-riveted steel conduit pipe** and special pieces, five-sixteenth- ($\frac{5}{16}$) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of .... ($.....) per lineal foot.

cccc. For all **40-inch double-riveted steel conduit pipe** and special pieces, three-eighths ($\frac{3}{8}$) inch in thickness, furnished and laid complete, including manufacturing, coating, transporting, laying, connecting, testing, keeping in repair for twelve months, and all incidental work, the sum of .... ($.....) per lineal foot.

303. **Monthly estimates.**—In order to enable said contractor to prosecute the work advantageously, it is hereby mutually agreed that said engineer shall, on or about the last day of each month in which any work has been done, make an estimate in writing of the amount of work done, and the value thereof according to the terms of this contract. Each estimate shall be of the entire amount
287 or quantity and value of the work done since said contractor commenced the performance of this contract on his part. From the amount of each estimate, except the final one, so mad by said engineer, there shall be deducted ten (10) per cent., to b retained until the final completion and acceptance of all the wor by said board, and the balance, less the total amount of all previou

payments, also less such sum or sums as may be otherwise retained as herein provided, shall be paid to said contractor by cash orders issued by said board on the treasurer of said city, on or about the 15th day of the month succeeding the month for which the estimate is made. Such estimates shall not be required to be made by strict measurements or with exactness, but they may, at the option of the engineer, be approximated only, and said engineer shall not be required to estimate the exact full amount and value of such work done.

304. **Estimates not conclusive.**—It is expressly agreed and understood by and between the parties hereto that neither said city, nor said board, shall be precluded or estopped by any estimate made by said engineer from, at any time, showing the true and correct amount, character or value of the work which shall have been done, and materials which have been furnished by said contractor, or any other person or persons, firm or corporation, under this contract.

305. **Estimates in case of disputes.**—In case any differences or disputes shall arise under this contract, relating to said work and materials, the decision of said chief engineer, when approved by said board, shall be a condition precedent to the right of said contractor to such estimate, and to receive any moneys under this contract.

306. **Estimates not an acceptance of work.**—No payments or estimates shall be considered as an acceptance of the work done or materials furnished, or as a release of said contractor from any responsibility connected therewith, and no partial payments or estimates shall be considered as controlling said engineer in making the final estimate, hereinafter mentioned.

307. **Payments.**—Said contractor further agrees not to demand, or to be entitled to receive, payment for any work or materials done or furnished under this contract except in the manner herein set forth; nor unless each and every one of the terms, covenants, and agreements herein contained to be performed, kept, observed and fulfilled on his part, have been performed, kept, observed, and fulfilled, and said chief engineer shall have given his certificate to that effect and said board shall have approved of such estimate.

308. **Reserve for repairs.**—It is further understood and agreed that said board may retain for the period of one year out of the moneys payable to said contractor under the final estimate hereinafter referred to, the sum of two (2) per cent. of the total value of the work done under this contract, as exhibited by said final estimate, and to deposit the same at interest in some savings bank or banks in said city. Said contractor shall designate the bank or banks in said city in which such deposit shall be made upon written request of said board, and upon his failure so to do within ten days after such request has been made, said board may deposit said moneys in such bank or banks as it may select, and such deposit, whether made at the request of said contractor or in the discretion of said board, it is mutually agreed shall be at the sole risk and loss of said contractor; and said board may draw upon and expend the same in the manner hereinafter provided for

in making such repairs on the line of said work as said engineer may deem necessary and expedient, and said board agrees upon the expiration of one year, as hereinafter provided for making repairs to said work, if the whole of said work shall at that time be in good order, to pay to said contractor the whole, or such part of the sum retained as aforesaid, together with the accrued interest thereon, as may remain after the expense of making said repairs shall have been paid therefrom.

309. **Final estimate.**—Whenever in the opinion of said chief engineer said contractor shall have completely performed this contract, said chief engineer shall prepare a final estimate and certify the same to said board, in which final estimate he shall state, from actual measurements, the whole amount of work done by said contractor, and also the value of such work under and according to the terms of this contract. On the expiration of sixty (60) days after the acceptance by said board of the work herein agreed to be done by said contractor, said city will pay said contractor by a cash order issued on the treasurer of said city, the amount remaining after deducting from the amount or value contained and stated in said final estimate, all such sums as shall theretofore have been paid to said contractor under any of the provisions of this contract, and also deducting all such sum or sums of money as by the terms hereof it is or may be authorized to reserve or retain: Provided that nothing herein contained shall be construed to affect the right of said board, hereby reserved, to reject the whole or any portion of the aforesaid work, should said final estimate be found, or known, to be inconsistent with the terms of this contract, or otherwise improperly given.

310. **Damages for failure to complete within time limited.**—In case said contractor shall fail to fully and entirely, and in conformity with the covenants, terms and agreements of this contract, perform and complete said work, and each and every part and appurtenance thereof, within the time hereinbefore limited for such performance and completion, or, within such further time as
289 may be allowed by said board for such performance and completion, said chief engineer shall appraise the value of the direct and computable damages caused to said city by such failure, owing to the disbursements made by said city on account of the further employment of engineers, inspectors and other employees, including all disbursements for office rent, transportation, supplies, and other matters connected with said employment; also the value of such other direct and computable damages as shall be caused by such failure; and the amount so appraised, when approved by said board, shall be deducted by said board out of such moneys as either may be due, or may at any time thereafter become due, to said contractor under and by virtue of this contract, or any part thereof; and in case said appraised value shall exceed the amount of said moneys, then said contractor will pay the amount of such excess to said city, on notice from said board of the excess so due; and it is hereby agreed that the decision of said chief engineer as to the said appraisal, when approved by said board, shall be final and binding on both parties to this contract.

311. **Assignments.**—Said contractor further agrees that he will give personal attention constantly to the faithful prosecution of the work, and will not assign or sublet the work or any part thereof, or any of the moneys or orders payable under this contract, without the previous written consent of said board endorsed on this contract; but will keep the same under his personal control; that no right under this contract, nor to any moneys or orders due or to become due hereunder, shall be asserted against said city or said board, or any department, officer or officers thereof, by reason of any so-called assignment, in law or equity, of this contract, or any part thereof, or of any moneys or orders payable thereunder, unless such assignment shall have been authorized by the written consent of said board endorsed on this contract; that no person other than said contractor now has any claim thereunder, and that no claim shall be made excepting under this specific clause of this contract, and under that clause relating to claims of workmen and materialmen.

312. **Abandonment.**—Said contractor further agrees that if the work to be done under this contract shall be abandoned, or if this contract shall be sublet or assigned by said contractor, or any of the moneys or orders payable thereunder shall be assigned, otherwise than as herein provided, or if at any time said chief engineer shall be of the opinion, and shall so certify in writing to said board, that the said work is unnecessarily or unreasonably delayed, or that said contractor is willfully violating any of the terms, covenants and agreements of this contract, or is not executing this contract in good faith, or is not making such progress in the execution of said
290 work as to indicate its completion within the required time, said board shall have the power and right to notify said contractor to discontinue all work or any part thereof under this contract, and upon such notification said contractor shall discontinue said work, or such parts thereof, as said board may designate; and said board shall thereupon have the power to employ by contract, or otherwise, and in such manner and at such prices as it may determine, any persons and obtain any animals, carts, wagons, appliances, implements, tools, and other means of construction, which it may deem necessary to work at and be used to complete the work herein described, or such part thereof as said board may have designated; also the power to use such appliances, implements, tools and materials and means of construction of every description as may be found upon the line of said work, both such as enter into the completed work, and such as are necessarily used in and about the same in the course of construction, and to procure other proper materials for the completion of the same; also to charge the expense of all of said labor, materials, animals, carts, wagons, appliances, implements, tools and means of construction to said contractor; and the expense so charged shall be deducted and paid by said board out of such moneys as may be due or become due at any time thereafter, to said contractor under this contract, or any part thereof. In case such expense is less than the sum which would have been payable under this contract if the same had been completed by said contractor, it is agreed that said contractor shall be entitled to receive the differ-

ence; and in case such expense shall exceed the sum which would have been payable under his contract if the same had been completed by said contractor, then said contractor shall pay the amount of such excess to said city, on notice from said board of the excess so due. It is further agreed that neither an extension of time, for any reason, beyond that fixed herein for the completion of the work, and the doing and the acceptance of any part of the work called for by this contract, shall be deemed to be a waiver by said city of the right to assume control of this contract for the reasons and in the manner hereinbefore provided.

313. **Cancellation of Contract for Default of Contractor.**—In lieu of the exercise of the power hereinbefore given, in case of said contractor's default, to employ workmen, purchase tools and materials, and complete the work, said board reserves the right and option, instead thereof, to annul and cancel this contract and relet the work, or any part thereof, and said contractor shall not be entitled to any claim for damages on account of such annulment, nor shall such annulment affect the right of said city to recover damages which may arise from such failure on the part of said contractor to fulfill the terms of this contract. And in case of such annulment all moneys due said contractor, or retained under the
291 terms of this contract, shall be forfeited to said city, and be paid to the credit of the fund for an additional water supply of said city; but such forfeiture shall, however, not release said contractor or his sureties for the fulfillment of this contract, and said contractor and his sureties shall be credited with the amount of the moneys so forfeited toward any greater sum that they may become liable for to said city on account of the default of said contractor.

314. **Cancellation of contract on account of litigation or other causes.**—Said contractor further agrees, that if, on account of any restraining litigation, or other litigation against said city, or said board, or if for any other reason, it may appear to said city, or said board, to be necessary, or for the interest of said city, to suspend the work entirely, and to cancel this contract wholly and completely, then said city and said board, or either of them, shall have the power at any time to cancel this contract wholly and completely, although said contractor may not be in default, and said contractor especially agrees that such cancellation, if done, shall not entitle him to any claim for damages, or for prospective profits on any work remaining to be done; but if said contractor be not in default, he shall be paid in full for all work done in accordance with this contract, up to the time of notice of such cancellation, and thereupon shall be released from all obligations hereunder for the completion of this contract.

315. **Protection of property.**—Said contractor further agrees, at his own cost and expense, to preserve, protect, and restore all properties that may be liable to injury or be affected in any manner by the work to be performed under this contract; and if he shall fail to do so, said board is hereby authorized and empowered to immediately preserve, protect or restore said properties, and the cost thereof shall be charged to said contractor, together with any dam-

ages sustained, and the cost so charged shall be paid to said city by said contractor within twenty (20) days after notice of the amount thereof, or said cost may be deducted from any money due, or to become due to said contractor under this contract.

316. **Claims of workmen and materialmen.**—Said contractor further agrees that he will pay punctually the workmen who shall be employed on the aforesaid work, and the persons who shall furnish material thereunder, and will furnish said board with satisfactory evidence that all persons who have done work or furnished materials under this contract, and shall have filed any account of such claims with said board, have been fully paid, or are not entitled to any lien under the laws of this State; and in case such evidence be not furnished as aforesaid, such amount as said board may consider necessary to meet the lawful claims of the persons aforesaid, shall be deducted from the moneys due said contractor under this contract, and shall not be allowed until the liabilities aforesaid shall have been fully discharged and the evidence thereof furnished said board; and if such evidence is not furnished before the final payment under this contract falls due, said board may pay such claims in whole or in part to the person or persons, firm or corporation claiming the same, and charge the amount thus paid to said contractor, who shall accept the same as payment to the amount thereof upon this contract.

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317. **Suits.**—Said contractor further agrees that he will indemnify and save harmless said city and board, and the officers and agents thereof, from all claims, suits, actions, and proceedings of every name and description, which may be brought against said city or board, or the officers and agents thereof, for or on account of any injuries or damages to persons or property received or sustained by any person or persons, firm or corporation, by or from said contractor, or by or in consequence of any materials or explosives used on said work, or by or on account of any improper material or workmanship in its construction, or by or on account of any accident, or of any other act or omission of said contractor, or his agents, or servants, and said contractor also agrees that so much of the money due, or to become due, to him under this contract as shall be considered necessary by said board, may be retained by said board until all such suits or claims for damages, or otherwise, as aforesaid, shall have been finally settled and determined, and evidence to that effect furnished to the satisfaction of said board.

318. **Quantities approximated.**—It is further agreed by and between the parties hereto, that the quantities of the various classes of work to be done, and materials to be furnished, under this contract, which have been estimated, as stated in the advertisement or notice of letting attached hereto, or in the form for proposals, are approximated, and submitted only for the purpose of comparing, on a uniform basis, the bids offered for the work under this contract; and said contractor further agrees that neither said city, nor said board, or either of them, are to be held responsible for any deviation or error whatever between the aforesaid quantities estimated and those required in the construction of said work; and that said contractor will make no claim for anticipated profits, or loss of profits,

because of a difference between the quantities of the various classes of work actually done, or of materials actually delivered, and the estimated quantities thereof stated in the said advertisement or notice of letting.

319. **Corrections and deviations.**—Said contractor also agrees that said chief engineer shall decide as to the meaning and intent of any portion of the foregoing specifications, or of the
293 plans, where the same may be found obscure or be in dispute; and said chief engineer shall have the right to correct any errors or omissions therein, when such corrections are necessary to the proper fulfillment of the intention of said plans and specifications; the action of such correction to date from the time said chief engineer gives due notice thereof. And it is also agreed by said contractor that said board may, at any time, make any changes in the location, form, dimensions, grades, and alignments, and may make any variations in the quantity of the work to be done, as exhibited in the advertisement or notice of letting hereto attached, or in the form of proposal or bid for said work, and may entirely exclude any of the items of work relating to said quantities at any time, either before the commencement of the work, or during its progress, without thereby altering or invalidating any of the prices herein named, or this contract, in any other respect; should such action diminish the amount of work that would otherwise be done, no claim shall be made for damages on the ground of loss of anticipated profits on work so dispensed with; and should such action be taken after the commencement of any particular piece of work, and result thereby in extra cost to said contractor, said chief engineer shall certify to said board the amount to be allowed therefor, which he shall consider fair and equitable, as between the parties, and his decision, when approved by said board, shall be final and conclusive.

320. **Disputes.**—To prevent all disputes and litigation, it is further agreed by and between the parties to this contract, that said chief engineer shall be the referee, in all cases, to determine the amount, quality, acceptability and fitness of the several kinds of work which are to be paid for under this contract, and to decide upon all questions which may arise as to the fulfillment of said contract on the part of said contractor, and his decision and determination, when approved by said board, shall be final and conclusive. Said contractor shall also afford all reasonable facilities for access to his work to any other parties or contractors who may be doing extra work or be working on a section of the conduit adjacent to his own, and any difference which may arise between two contractors in regard to their adjoining work is to be adjusted by said chief engineer, whose decision in the matter shall be final and binding upon both parties.

321. **Suspension of work.**—Said board reserves the right of suspending the whole, or any part of the work herein contracted to be done, if it shall deem it for the interest of said city so to do, without compensation or allowance to said contractor for such suspension, other than an extension of the time for the completion of the work as much as it may have been delayed by such suspension.

And, if the said work shall be delayed for the reason that said
294 city does not own, or has not obtained an easement in, and possession of, the land on which the same is to be performed, or in case the State authorities, or the courts, shall obstruct, or order a suspension of the work, or any part thereof, then, and in that case, and in every such case, said contractor shall be entitled to so much additional time wherein to perform and complete said contract on his part, as said chief engineer shall certify to said board in writing to be just. Said contractor agrees to submit to all such delays, suspensions or obstructions aforesaid, when ordered or notified by said board of the necessity thereof in writing, without compensation therefor, and hereby agrees that he will make no claim for damages against said city, or said board, or any of its officers or agents or servants, on account of such delays, suspensions, obstructions or orders, other than for such an extension of time as said chief engineer may deem just, within which to complete such portions of the work as are affected by the delay, caused as aforesaid. It is also understood and agreed that should the date of the final completion be so extended, no rights of said city and said board, or either of them, under any clause of this contract, nor any obligation or liability of said contractor, or his sureties, shall be waived, lost or impaired by such extension, but every clause of this contract, and the accompanying bonds, shall apply in respect to the time, so extended by such written declaration of said board or chief engineer.

322. **Extra work.**—No claim for extra work shall be considered or allowed, unless such extra work shall have been previously ordered by said engineer, in writing. The claims for such extra work, when so ordered, shall be presented to said board on or before the 15th day of the month following that in which said extra work is done, otherwise such claims during that month will be forfeited and waived. In case any extra work shall be required in the proper performance of the work contemplated to be done under this contract, it is understood that said board reserves the right to have such extra work done by any other person, firm or corporation than the said contractor, unless an agreement upon the prices to be paid for such extra work can promptly be reached between said board and contractor. Should said extra work be let to any other person, firm, or corporation than said contractor, said contractor further agrees that he will not, in any way, interfere with, or molest, such person, firm or corporation, and that said contractor will suspend such part of the work herein specified, or will carry on the same in such manner as he may be ordered by said engineer, so as to afford all reasonable facilities for doing such extra work; but said contractor agrees to make no claim for damages, or for any privileges or rights, other than expressed by this contract, by reason of the suspension and the doing of such extra work, except for an
295 extension of time to perform this contract, as may be certified to said board in writing by said chief engineer, and approved by said board.

323. **Engineer and Inspectors.**—Said contractor further agrees that whenever said chief engineer may be unable to act in

consequence of absence, removal, or other cause, then such other engineer, or assistant, as said board shall designate, shall perform all the duties and be vested with all the powers herein given to said chief engineer, whether designated herein as such, or as engineer; and said contractor also agrees that said board shall be, and is hereby authorized to appoint such other person or persons, as it may deem proper to act in place of said engineer, or to inspect the work done and materials furnished under this contract, and see that said work and materials conform to the plans, specifications and subsequent instructions and directions, and that said person or persons, as well as said engineer, shall be afforded all proper facilities for discharging the duties assigned to them.

324. **Repairs.**—Said contractor further guarantees that all the work performed by him for said city under this contract will stand in good order against all casualties for twelve (12) months after the same shall have been faithfully completed, and accepted by said board; and he agrees that if at any time during a period of one year from the date of the final test, completion and acceptance of the work herein contemplated, any part of said work shall, in the opinion of said engineer, require repairing, and said engineer shall notify said contractor in person, or by mail, to make the repairs so required, then, if said contractor shall neglect to begin such repairs within three days from the date of giving or mailing such notice or shall fail to proceed with such repairs to the satisfaction of said engineer, the said engineer shall have the right to employ such other person, or persons, as he may deem proper to make the same, either by contract, or otherwise, and said board shall pay the expenses out of the sum retained for that purpose by it, as hereinbefore mentioned. It is also agreed that if, at any time during said period of one year, it shall become necessary in said engineer's opinion to make any repairs to the said work immediately, the aforesaid notice is hereby waived by said contractor, and said engineer may cause such repairs to be made at once by any other person or persons, the expenses thereof to be paid by said board out of the sum retained as aforesaid.

325. **Contract Bonds.**—Said contractor further agrees that he will execute bonds, in such form and sum, and with such sureties as shall be approved by said board, conditioned to indemnify and save harmless said city and said board from all suits, actions or proceedings of every name or description, in law or equity, brought
296 against said city or said board, or both, or any officer or officers, agents or servants thereof, for or on account of any injuries or damages received or sustained by any person, structure or property, by or from said contractor, his servants or agents, in the prosecution of the work; or by or in consequence of any negligence in guarding the same; or by or on account of any act or omission of said contractor, or his servants or agents; and for the faithful performance of this contract and the payment of all workmen's wages by said contractor.

326. **Meaning.**—Said contractor hereby admits that he has read each and every clause in this contract, and fully understands the meaning of the same, and hereby agrees that he will comply with all the terms, covenants and agreements herein set forth.

297 **In Witness Whereof,** The chairman of said board has hereunto set his hand and seal, on behalf of said city, and said

and the parties hereto have executed this agreement in triplicate, two parts of which are to remain with said board, and the third to be delivered to said contractor, the day and year first above written.

Signed, sealed and delivered in the presence of the respective parties.

Chairman of the Executive Board of the City of Rochester.

Contractor.

STATE OF NEW YORK, *County of Monroe, City of Rochester,* } ss:

On this day of 189 . , before me, personally came George W. Aldridge, to me known, and known to me to be the chairman of the executive board of the city of Rochester, described in and who executed the foregoing instrument, and he duly acknowledged that he executed the same, for and on behalf of said city.

298 STATE OF NEW YORK, } ss:
County of ——, *City of* ——, }

On this day of 189 ,
before me, the subscriber, personally appeared

to
me personally known, and being by me duly sworn, did depose and say: I am the president

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and said seal affixed by me on behalf of said corporation by authority of the board of directors of said corporation; and said
as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

STATE OF NEW YORK, } ss:
County of ——, *City of*——, }

On this day of 189 ,
before me, the subscriber, personally appeared

to me known to be the same person described in and who executed the foregoing instrument, and he duly acknowledged that he executed the same.

299 **CONTRACT BOND.**

Know all Men by These Presents, That

principal , residing in

and

sureties, are held and firmly bound unto the City of Rochester, New York, in the sum of two hundred and fifty thousand dollars ($250,000.00), lawful money of the United States of America, to be paid to the said City of Rochester, its successors and assigns, for which payment, well and truly to be made, we bind ourselves, and each of our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals this day of in the year of our Lord one thousand eight hundred and ninety

The Condition of This Obligation is such that, whereas, the said

principal ha entered into a contract with said City of Rochester, bearing date the day of 189 , hereto annexed:

Now, Therefore, If the above-bounden

heirs, executors, administrators, successors or assigns, shall, in all things stand to, and abide by, and well and truly keep and perform, the terms, covenants, conditions, and agreements in said contract contained on part to be kept and performed, and each of them, at the time, and in the manner and form therein specified, and indemnify and save harmless said city, and the executive board thereof, and its officers and agents, as provided in said contract, then this obligation shall be null and void; otherwise to be and remain in full force and virtue.

300 **In Witness Whereof,** The parties hereto have hereunto set their hands and seals this day of in the year of our Lord one thousand eight hundred and ninety

301 STATE OF NEW YORK, } ss.:
County of ——, *City of* ——, }

On this day of 189 ,
before me, the subscriber, personally appeared

to me known to be the same persons described in and who executed the foregoing instrument, and they severally duly acknowledged that they executed the same.

302 STATE OF NEW YORK, } ss.:
County of ——, *City of* ——, }

On this day of 189 ,
before me the subscriber, personally appeared

to me personally known, who, being by me duly sworn, did depose and say: I am the president of the

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said

as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

STATE OF NEW YORK, } ss.:
County of ——, *City of* ——, }

On this day of 189 ,
before me the subscriber, personally appeared

to me personally known, who, being by me duly sworn, did depose and say: I am the president of the

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said

as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

303 STATE OF NEW YORK, } ss.:
County of ——, *City of* ——, }

being duly sworn deposes and says: I am the president of

a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm, or corporation desiring the same; said

is worth the sum of
dollars, over and above all the debts now existing against said

either by way of bond, mortgage, or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of 189 .

304 STATE OF NEW YORK, } ss:
County of ——, *City of* ——, }

being duly sworn deposes and says: I am the president of

a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm, or corporation desiring the same; said

is worth the sum of
dollars, over and above all the debts now existing against said

either by way of bond, mortgage, or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of 189 .

305 STATE OF NEW YORK, } ss.:
County of ——, *City of* ——, }

sureties within named, being duly sworn, depose and say, and each for himself says:

over and above all debts and liabilities which he owns or has incurred, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me this day of 189 .

306 **LABORERS' BOND.**

Know all Men by These Presents, That

principal ,

residing in

and

sureties, are held and firmly bound unto the city of Rochester, N. Y., in the sum of one hundred thousand dollars ($100,000), lawful money of the United States of America, to be paid to the said city of Rochester, its successors and assigns, for which payment well and truly to be made, we bind ourselves, and each of our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals this day of , in the year of our Lord, one thousand eight hundred and ninety .

The condition of this obligation is such, that, whereas, the said

ha entered into a contract with the said city of Rochester, bearing date the day of 189 , hereto annexed:

307 **Now, Therefore**, If the above-bounden

principal heirs, executors, administrators, successors, or assigns shall pay, or cause to be paid the wages and compensation of all laborers who shall be employed in work on or about such contract and improvement, whether employed by said

or by any subcontractor, or employee, then this obligation to be void otherwise to be and remain in full force and effect.

In Witness Whereof, The parties hereto have hereunto set their hands and seals this day of in the year of our Lord one thousand eight hundred and ninety .

308 STATE OF NEW YORK, }
County of ——, *City of* ——, } ss.:

On this day of , 189 , before me, the subscriber, personally appeared

to me known to be the same persons described in and who executed the foregoing instrument, and they severally duly acknowledged that they executed the same.

309 STATE OF NEW YORK, } ss:
County of ——, *City of* ——, }

sureties within named, being duly sworn, depose and say, and each for himself says: The said

that he is a freeholder of the State of New York and is worth the sum of

dollars

over and above all debts and liabilities which he owes or has incurred and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of 189 .

273

ROCHESTER WATER WORKS.

1892.

310

DIAGRAMS

EXHIBTING LIMITS OF EXCAVATION AND MASONRY IN OPEN TRENCH AND TUNNEL WORK THAT WILL BE ESTIMATED FOR PAYMENT

IN CONSTRUCTION OF

MASONRY WATER CONDUIT.

REFERENCE.

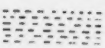
—·—·— INDICATES LIMIT OF AREA WITHIN WHICH EXCAVATION AND MASONRY WILL BE ESTIMATED FOR PAYMENT.

INDICATES BRICK OR RUBBLE LINING MASONRY PAID FOR.

INDICATES BRICK OR RUBBLE LINING MASONRY NOT PAID FOR.

INDICATES CONCRETE OR RUBBLE BACKING OR FILLING MASONRY PAID FOR.

INDICATES CONCRETE OR RUBBLE BACKING OR FILLING MASONRY NOT PAID FOR.



INDICATES DRY FILLING. PAYMENT FOR WHICH IS TO BE INCLUDED IN PRICES FOR EXCAVATION.

NOTE.—The following Diagrams are not drawn to scale. Inside dimensions of Conduit may be from 6 to 6½ feet high and wide, and the thickness of the brick or rubble lining Masonry may be varied according to circumstances and the kind of masonry used.

E. KUICHLING, Chief Engineer.

November 1, 1892.

315 *Stipulation.*

United States Circuit Court, Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY
against
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester.

It is hereby stipulated between the counsel for the respective parties herein that the testimony of Emil Kuichling, Thomas J. Neville, Edwin A. Fisher, Gaylord Thompson, Frederick C. Lauer, witnesses for the defendants herein, may be taken before William W. Gilbert, United States commissioner; the testimony of said witnesses, being taken stenographically by E. Darwin Smith; that three copies of said testimony be made by the stenographer, the expense being equally divided between the parties hereto, the prevailing party to tax as an item of expense the amount advanced.

Dated Rochester, N. Y., June 30, 1896.

JENNY & MARSHALL,
Attorneys for Plaintiffs.
A. J. RODENBECK,
Attorney for Defendants.

316 *Defendants' Evidence.*

United States Circuit Court, Northern District of New York.

THE MOFFETT, HODGKINS & CLARKE COMPANY
against
THE CITY OF ROCHESTER and GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester.

Hearing had at the office of the corporation counsel of the city of Rochester, at Rochester, N. Y., on the first day of July, 1896, before W. W. Gilbert, U. S. commissioner, pursuant to a stipulation between the attorneys for the parties.

Appearances.

Mr. Marshall, for the plaintiffs; Mr. Rodenbeck, for the defendants; Mr. W. F. Cogswell, of counsel for defendants.

317 EMIL KUICHLING, being duly sworn, testified as follows:

To Mr. RODENBECK:

Q. What is your occupation?

A. A civil engineer, and, at present, chief engineer of the Rochester water-works department and general superintendent.

Q. How long have you held that position in the city?

A. Since the fall of 1890. Prior to that I was for two or three years in general private practice.

Q. Will you state fully what your experience has been as an engineer of water works, or otherwise?

A. I commenced as a lad, about fourteen, to learn the profession of a civil engineer, and I was engaged at that time on the New York State canals and afterwards in the city surveyor's office of this city. I then went to college to get my education, and graduated from college in 1868. I went into practice again on the New York State canals, and returned to college and took a post-graduate course, and went back into practice, and then took a second post-graduate course at Carlsruhe, Germany, and returned from Germany in the winter of 1872 and resumed work on the New York State canals. In the spring of 1873 I was engaged by Mr. Tubbs, then chief engineer of the Rochester works, to assist in the construction of a conduit that was projected at that time, which is known as the "old conduit." I remained as Mr. Tubbs' assistant for some twelve years, and was then elected a member of the executive board of the city of Rochester, or what is more properly known as the commissioners of public works, in which the water works and all other public improvements were under my charge, or, rather, under the charge of the board. I remained in that board until the fall of 1887, and resigned to go into private practice, with the view of designing a large sewer for the city of
318 Rochester for the east side. During all those years I was necessarily engaged in outside consulting work and construction work, and, while in Europe, I visited all the large public works going on—water works, railroad and sewer works, and, in this country, I have also visited many of them, in different parts of the country. In 1883, I went to Europe a second time for study and observation. The third time was in 1889. In the fall of 1889, I was engaged on the East Jersey Water Company's operations in supplying water for the city of Newark, under Mr. Herschel as chief engineer; also on some work for the Niagara Falls Power Company—I think the Cataract Construction Company is the corporate name—I don't remember the title—of which Mr. Herschel was hydraulic engineer, and until the fall of 1890, I was thus engaged. In that year, I was called to Rochester to take charge of the water works and the extension of same thereafter to be built—a new conduit line.

Q. The plans, drawings and specifications for the construction of the new conduit for the city of Rochester, were prepared by you, or under your direction?

A. Yes, sir.

Q. And you have gone over the route of the new conduit a great many times?

A. Yes, sir.

—. And know the character of the country through which it passes?

A. Yes, sir.

Q. What do you say, as to whether or not, the specifications for the new conduit are more elaborate than necessary?

A. I say they are not more elaborate than necessary.

Q. What do you say, as to whether or not, they are more in detail than necessary to give a full understanding of the work to be done?

A. They are not more in detail than necessary to give a full understanding of the work to be done.

319 Q. You know Mr. Burlingame, the engineer of the complainant?

A. Yes, sir.

Q. You met him here in the city, when he was preparing a bid for this work?

A. Yes, sir.

Q. Did he call at your office?

A. Yes, sir; called, presenting a letter of introduction from an old personal friend of mine. In consequence of which, I gave Mr. Burlingame special attention; he and his assistant. Mr. Burlingame came with an assistant. I have forgotten his name—a younger man. I gave them every opportunity to ask questions, and get all the information on the subject that was possible.

Q. Did you with-old from him any information with reference to the work upon which he proposed to submit a bid—were you conscious of having withheld the slightest information?

A. No, sir.

Q. Did you have any talk with Mr. Burlingame as to whether or not these contracts were to be let to the lowest aggregate bidder?

Mr. Marshall objected, upon the ground that the contracts will show for themselves.

A. There was no such discussion at all. I don't remember the question being asked. The notices of letting showed for themselves that they were to be let separately, and bids were to be received separately.

Q. The notices of letting will show for themselves?

A. Yes, sir; the question never was raised.

Q. Did you ever notify Mr. Burlingame, or Mr. Moffett, or any one connected with the corporation of the Moffett, Hodgkins & Clarke Company, that the contracts would be let together, to the lowest aggregate bidder?

A. No, sir.

320 Q. In your judgment, how much time would there be necessary for an experienced man to submit a bid upon the work called for by the notices of letting, under contracts No. 1 and No. 2?

Mr. Marshall objected, as immaterial and incompetent, and not a question of expert testimony.

A. I would say, from my own personal knowledge of contracting work, having made bids for contractors on public works, that, in this case, with the plans, specifications and maps, prepared as they were, and an examination of the subsoil by the borings prepared and advertised on diagrams; the borings located and test-pits shown on the different points on the work, that a period of three

days would have been ample for any stranger to this locality to have gone over the ground, and made his examination, and made a thoroughly intelligent bid on this work.

Q. How much time do you think it would have taken for an experienced man to submit bids on contracts Nos. 1 and 2, after having gone over the work?

Mr. Marshall objected, the same as before.

A. He could have made his bid, if necessary, within twelve hours afterwards, or, in fact, in less time. He would have to figure his estimates of the prices on the work while going over the ground, and a compilation and average of the costs of the different parts of the work would have then been a very simple matter. A few hours would have been sufficient to have made those averages, because the items of that kind were very small in number. The main point is in the prices for the material, and it is assumed in that, that a competent and experienced man would have come well prepared with all such prices, so that it would have been merely a clerical work in writing them in.

Q. Did you cause to be published in certain newspapers the notices for proposals for this work?

A. Yes, sir.

321 Q. What papers?

A. I caused it to be placed in the four daily newspapers in this city, to wit: the *Democrat and Chronicle*, the *Morning Herald*, or *Rochester Herald*, I think it is called; the *Union and Advertiser* and the *Post-Express;* also, in two professional journals, weeklies—the *Engineering News* and *Engineering Record*, of New York city.

Q. When was that first publication made in those papers?

A. I think the first publication appeared on December 9th or 10th, 1892.

Q. Do you know how long the publication continued?

A. They were ordered to be put in daily until the date of the letting, which was December 23d. In the two weekly papers published in New York, my impression is that it appeared in three separate issues.

Q. You were present when the bids for this work were opened by the executive board?

A. Yes, sir.

Q. Do you recollect when the bid of the complainants here was opened and read?

A. Yes, sir.

Q. Will you state what occurred at that time, in reference to their bid?

A. The bids were first arranged according to their contract number and notice of letting. I should have said the notice of letting, the proposals and form of contract and specifications were all bound together in a small volume or pamphlet. There were different pieces of work bid for and were called, for convenience, contracts 1, 2, 3 and 4, each relating to different pieces of work. The bids were received in envelopes or packages, sealed. On opening the

packages the outside cover at once indicated which piece of work the bid referred to. The bids were then arranged in piles, according to their contract number. Among the first, I think, that happened to be on top of the pile for the contract work was the bid of
322 the Moffett, Hodgkins & Clarke Co. This bid was in the form of two books, tied or fastened together, and on my opening this packet, or this bid, it attracted my attention at once, that there should be two books with the same cover and the same contents, substantially, tied together, and I looked farther to see whether the proposal, which was one of the documents of the book, was signed, and I found it was not, but, on turning to the second book I found that to be signed there.

Q. The proposals will show for themselves?

A. Yes, sir.

Q. Just state what occurred before the executive board?

A. All this was handed to Mr. Neville by me. I think either he or I called the chairman of the board's attention to this circumstance of the two books being fastened together. The question arose in my own mind——

Mr. Marshall objected.

Q. I want just what occurred when the bids were opened by the board in session.

. A. This bid was referred to the executive board or to the chairman, and on its being so referred Mr. Burlingame jumped up and explained to the board how it came about that the two books were thus tied together, and how the signatures to the proposal and bond were in one book, and not in the other. The chairman of the board, Mr. Aldridge, directed that the bid be laid aside, temporarily, until he could consult with his associates. After that the remaining bids were then read by the clerk, in public, and each contractor made his own notes of the prices bid, and I took down the prices, for my own use, for publication and for summarization. After the reading was over, the question came up as to what should be done with the bid of the Moffett, Hodgkins & Clarke Co. The chairman of the board directed that the bid should be received and read, the same
323 as the others, and they were so read and tabulated and received, the same as the others. I was going to say that whenever there was any question——

Mr. Marshall objected to generalizations.

Q. You say that the bid of the Moffett, Hodgkins & Clarke Co. for contracts No. 1 and No. 2 was received and treated in all respects as the other bids on the contract?

A. Yes, sir.

Q. Did the executive board, or any member of the board, say that the bid wouldn't be received?

A. No, sir; it was not stated at all.

Q. In your experience as an engineer you have been called upon to make estimates of the cost of doing work?

A. Yes, sir.

Q. And of the cost of making earth excavations in open trenches?
A. Yes, sir.
Q. You are familiar with the work called for by subdivision D of route B of contract No. 2?
A. Yes, sir.
Q. What do you say as to whether or not that work could be done for fifty cents per cubic yard, without a loss?

Mr. Marshall objected as immaterial and incompetent and too general.

A. I say it could be done for fifty cents per cubic yard, without a loss.
Q. Have you carefully gone over the bids submitted by the Moffett, Hodgkins & Clarke Company of contract No. 2 with a view of determining whether or not the work called for in that contract could be done under their bid, without a loss?
A. Yes, sir.
Q. What do you say as to whether or not the work called for by the contract could have been done under their bid, with or without a loss?

324 Mr. Marshall objected the same as before.

A. I say the work could have been performed at the prices mentioned in this bid of the Moffett, Hodgkins & Clarke Company by experienced contractors without a loss.

Cross-examination by Mr. MARSHALL:

Q. Have you stated all that you recollect as to what transpired at the time the bids were opened at the meeting of the executive board on the day the bids were presented?
A. Substantially all. I started to say something further but was met with an objection.
Q. You were generalizing?
A. I don't call it generalizing. I was going to state my own practice and habit, and the rule that I had established for my own conduct, both as an assistant and chief engineer.
Q. I merely wanted to know if you have stated all that was said and done at this time?
A. Substantially all.
Q. Of course, you were very familiar with all this work, because you had prepared the plans and specifications?
A. Yes, sir.
Q. And it took you a long time to prepare them?
A. Yes, sir.
Q. You spent many months in their preparation and elaboration?
A. Yes, sir.
Q. You had had a large experience in the construction of water works, and doing work of a similar nature, before you had anything to do with the planning of this work?
A. Yes, sir.

Q. When you stated as to the length of time it would take
325 to do work of this character, and make an estimate, you based it very much upon your knowledge of the work which was to be performed under these advertisements upon this contract?

A. To some extent. Also, upon my own experience as an engineer, or, as matter of fact, in preparing for contractors' bids for other work—for instance, railroad work. I have made bids in my own name for railroad work—for the elevated-track work in this city, amounting to over a million dollars. I have prepared bids for contractors in dozens of places, so I have a little experience in this matter.

Q. I realize that you have had a very large experience.

A. Not perhaps so much as a contractor who makes that his daily business.

Q. In giving your opinion as to this matter, it is difficult for you to dissever the knowledge which you personally had of this work, as contained in these specifications which were prepared by you, from the knowledge which a stranger would have when he first came to inspect these specifications?

A. I would hardly say that, inasmuch as the specifications which I prepared were not very much different from what was usual, in New York, Boston, Providence, in Buffalo and other large cities where similar work was under progress.

Q. Of course, it is an important thing, for any one bidding on this work, to understand the topography of the ground?

A. Yes, sir.

Q. Rock-work in tunnels is more expensive in some localities than in others?

A. Yes, sir.

Q. So, that, a person who wanted to be intelligent upon the matter of this work, must have knowledge of the locality and the material which it will be required to go through, in order to arrive at the excavation, etc.?

326 A. Yes, sir; those were all given from the borings of the subsoil. I might remark that this information was available to them all.

Q. You didn't conceal anything from anybody?

A. No, sir.

Q. You gave to everybody the fullest opportunity to get any information they could?

A. Yes, sir. I would further say, as to the nature of the soil, I had a hundred samples of the borings tabulated, and marked, done up in envelopes, and every boring was numbered, and the number of that boring was placed on a large map.

Q. How many borings were there?

A. A hundred of them. I couldn't tell how many.

Q. Taken from along the line?

A. Yes, sir. My object was to avoid, as much as possible, rock excavation; also, to avoid quicksand. A number of changes were made from where we had fixed the line originally. On going over the ground, I thought, from my knowledge of the geology of the

locality, that perhaps we could find quicksand, and I caused borings to be made in those places separately, a large number of them, so as to find a place where we could locate our line at the least possible cost, and samples of the material were there for exhibition.

Q. There were places where there was considerable hard-pan upon this line, of course?

A. There were only two places in sight where there was any prospect of finding hard-pan.

Q. There was, in fact, considerable hard-pan along this line?

A. No, sir.

Q. How much?

A. I don't think, in the aggregate, there was 1,000 yards on the whole work covered by contract No. 2.

Q. On route B?

A. We didn't construct it on route B.

327 Q. How much hard-pan was there on route B?

Mr. Rodenbeck objected, as immaterial; that the work was not performed there.

A. I think some less, if any, than on route A.

Q. Was there any quicksand on route A?

A. Yes, sir; there was a little on route A.

Q. Was there any on route B?

A. Not that we could discover.

Q. No; because you never built there?

A. We will put it in this way: Route A and route B were identican the whole length, with the exception of some 8,000 feet, a mile and a little over a half, and there, the two lines formed a loop, beginning at the same point, and going back to the same point. Now, on that 8,000 feet of the route, we didn't build, and I can give you nothing, only such evidences as we had from the borings which we took.

Q. Explain what the difference was between route A and route B, beginning at the 8,000 feet.

A. The difference on route A, is, we would cross the creek several times—I think more than five times. The route is located in the alluvial flats through which Honeoye creek meanders, and involves several crossings of the existing and former channels of said creek. These crossings were to be made either by carrying the conduit pipe over said channels upon suitable permanent bridges, supported upon proper abutments and piers, as might be determined thereafter, in each locality, from thorough examinations of the subsoil. If iron bridges were used, the metal-work would be furnished and erected by the executive board. Route B is located wholly on the west side of Honeoye creek, and avoids the said crossings, by following the course of a certain lateral valley for some distance, and then returning to the west bank of said creek by means of a masonry

328 conduit to be provided with the necessary shafts, inlet and overflow chambers, manholes and other appurtenances.

Q. The general character of the two routes is about the same?

A. Yes, sir; with that exception, of the 8,000 feet.

Q. In this 8,000 feet the general character of the soil in which you operated was also quite similar?

A. No; because in the tunnel portion of route B we would have, presumably, dry excavation. The bottom of the tunnel, being a good many feet above the general level of the creek, we would, therefore, have, presumably, dry excavation; whereas by route A, if we went under the creek, we would have rather wet excavation. In fact very wet excavation.

Q. There wasn't any rock excavation in tunnel on route A?

A. We didn't expect any. The prices for rock excavation were taken in the anticipation that there might be boulders in the clay, some boulders that would require blasting.

Q. As matter of fact you didn't put in any price of rock excavation on route A?

A. No, sir; there was no tunneling there.

Q. That was the principal distinction between the two routes?

A. Yes, sir.

Q. On route B you expected rock excavation in tunnel, but in route A you didn't expect any?

A. Didn't expect any tunneling at all nor did we consider that there would be much rock excavation in tunnel on route B, because we knew from the borings that there was no ledge rock in any place.

Q. And yet you estimated the quantity of rock excavation in tunnel on route B as 200 cubic yards?

A. I don't remember. Yes, sir; that is, expecting we might meet these boulders, which might be taken, under the con-
329 tract as rock excavation, and I inserted also a quantity for rock excavation on the tunnel in order to have the price.

Q. When the bids were opened what was the price which was bid by the Moffett, Hodgkins & Clarke Company for earth excavation in open trench under route A?

A. Taking the printed sheet to be correct, and I believe it to be, because I read the proof on in very carefully, it was 70 cents per cubic yard.

Q. How many cubic yards of material were estimated?

A. 184,000.

Q. What was the price bid by Whitmore, Rauber & Vicinus for the same work?

A. Seventy-five cents.

Q. By the Carroll & Porter Boiler and Tank Company?

A. Eighty-five cents.

Q. By the Rochester Construction Company?

A. Eighty cents.

Q. What was the amount bid upon route B by the Moffett, Hodgkins & Clarke Company?

A. Fifty cents.

Q. Whitmore, Rauber & Vicinus?

A. Seventy-five cents.

Q. The Carroll & Porter Boiler and Tank Company?

A. Eighty-five cents.

Q. The Rochester Construction Company?
A. Eighty cents.
Q. What was the price bid for earth excavation in tunnel by the Moffett, Hodgkins & Clarke Company upon route B?
A. $1.50.
Q. Whitmore, Rauber & Vicinus?
A. $15.00.
Q. The Carroll & Porter Boiler and Tank Company?
A. $12.00.
330 Q. The Rochester Construction Company?
A. $12.00.
Q. The work of constructing the conduit, which you advertised for, was let by the executive board of the city of Rochester to Whitmore, Rauber & Vicinus, finally?
A. Yes, sir; originally to the Moffett, Hodgkins & Clarke Company.
Q. The work was done by Whitmore, Rauber & Vicinus under the contract?
A. Yes, sir.
Q. Under which route was the work awarded to them?
A. To route A.
Q. Under contract No. 2?
A. Yes, sir.
Q. When did they begin work under that contract?
A. A few weeks after the contract was signed.
Q. When was the work completed?
A. I think in November, 1894; begun in March, 1893.
Q. Do you know what quantity of earth excavation that you finally allowed for that work, on open trench?
A. It was substantially what it was estimated here.
Q. There wasn't any earth excavation in tunnel at all?
A. No, sir; there was no price taken under route A. There was no tunnel made and no price taken.
Q. What was the ordinary price for which earth excavation in open trench was done in this vicinity about the time this contract was let?
A. From forty cents per cubic yard to perhaps fifty cents in this character in trenches as it would have to be back-filled.
Q. Where?
A. In this city; in the streets of this city, for sewer-work and for laying water pipe, and in Buffalo and Cleveland.
Q. I am talking about the city of Rochester.
A. Yes, sir.
331 Q. Who did work at that price?
A. I presume that an analysis of it——
Q. Do you know of anybody that did it—can you name any persons?
A. Not at present. I can give you that by looking over the bidding sheets.
Q. You cannot name any person now?
A. No, sir; I would put it in this way, in explanation of my

answer, that the contractors generally bid for street and sewer work, for back-filling, they estimated some forty or fifty cents a cubic yard. That is a sort of a general ruling price. Now, the prices usually paid by the city are by the lineal foot. If a sewer has to be built they bid $1.50 a foot. I know from the price of the tile or masonry that is put in that the material that they have to purchase costs them, say fifty cents a foot. That leaves them for performing the excavation one dollar per lineal foot, and from the depth and width of the trench I estimated the number of cubic yards, and in that way I arrived at their figures without their publishing figures.

Q. Then, as I take it, all you mean to say is, that, according to your method of analyzing the bids which have been made in the city in recent years for sewer-work, you, by a certain process of reasoning arrived at the conclusion that there was included in that bid a certain allowance, which you have given as fifty cents, for earth excavation?

A. Yes, sir.

Q. That, as matter of fact, there was no specific bid made by these contractors to whom you refer?

A. Yes, sir; in this city. Also, in conversation with contractors, I would say——

Q. Look at the summary of the proposals received for contract No. 1 and state what was the bid for earth excavation in open trench, estimated at 25,000 cubic yards in quantity, by the various contractors that presented bids on December 23rd, 1892?

332 A. Earth excavation in open trench, item E, 85 cents per cubic yard, by the Rochester Construction Company; $1.25 by N. L. Brayer; 70 cents, William H. Jones & Sons; Whitmore, Rauber & Vicinus, 90 cents; 95 cents, by Chambers & Casey; 95 cents, by the Carroll-Porter Boiler and Tank Company of Pittsburgh, Pa.; 75 cents, by the Moffett, Hodgkins & Clarke Company.

Q. The excavation in open trench is the same as the excavation in open trench in contract No. 2?

A. Not wholly.

Q. The same general character?

A. No, sir.

Q. How did it vary?

A. Because in this case they had a very deep excavation; also wet excavation. They were lower for a long distance and very close to the old conduit line, which had to be protected and kept from damage. It was all known to be what is called rather heavy excavation.

Q. There was only 25,000 cubic yards?

A. Yes, sir; it was general, in quantity.

Q. The general character was very similar?

A. No; I say they were very dissimilar, one being wet and the other dry. That is the difference.

Q. There were portions of this earth excavation in contract No. 2 which were wet?

A. A very small percentage corresponding to what we have in contract No. 1.

Q. You said, in answer to the counsel, that the work could have been done under route B by an experienced contractor for the price specified for the same character of work in the bid made by the Moffett, Hodgkins & Clarke Company?

A. Yes, sir; I think it could have been done.

Q. Do you know how much it cost Whitmore, Rauber &
333 Vicinus to do the work?

—. Not exactly. We have rather approximate knowledge, but no computation. Our account has not been fully completed.

Q. I mean how much it actually cost them?

A. I know that only approximately. That is to say, a force account of Whitmore, Rauber & Vicinus was kept.

Q. What do you mean by "force aacount"?

A. The number of employés in the different classes was kept daily, that the contractors employed; kept by the engineers, and the amount of material that was furnished by the contractor we also knew, because we had to measure that up and estimate it for payment, so that if all these reports which were made to me by my assistants were tabulated and arranged I could then form a very close estimate of the actual cost of this work to Whitmore, Rauber & Vicinus.

Q. You say that is not fully completed?

A. In part. We have some data which gave us some idea of about what the work cost them.

Q. Did you make an estimate of the probable cost of this work before it was let?

A. Yes, sir.

Q. Have you your figures here?

A. No, sir; I have not.

Q. Will you look at this summary of proposals for contract No. 2 and state what the aggregate bids were of the various persons who offered to do this work in route A (showing paper)?

A. For a 38-inch steel pipe, being the pipe that was actually used, the Moffett, Hodgkins & Clarke Company's bid was $903,224. Whitmore, Rauber & Vicinus, for the same work, $1,123,920. The Carroll-Porter Boiler and Tank Company, $1,208,002. The Rochester Construction Company, $1,331,885.

Q. On route B what was Moffett, Hodgkins & Clarke Company's bid?

A. $857,552.50.

334 Q. Whitmore, Rauber & Vicinus?

A. $1,130,195.

Q. The Carroll-Porter Boiler and Tank Company?

A. $1,215,382.

Q. The Rochester Construction Company?

A. $1,249,935.

Q. You made no effort to readvertise for bids after this difficulty arose with the Moffett, Hodgkins & Clarke Company?

A. I would say I made this effort. I wrote to——

Q. I mean the executive board?

A. The executive board, at my instigation, caused me to write to a

number of cast-iron pipe manufacturers to determine whether a price for the cast-iron pipe lower than received at the time of letting would probably — submitted on a readvertisement of the cast-iron part of the contract, and these inquiries were made by me in the form of letters to a number of different foundrymen.

Q. The work that was actually let was for steel riveted pipe?

A. It was let for that after it was found that the cast-iron pipe foundrymen wouldn't furnish pipe much lower.

Q. Was there any effort on the part of the executive board to readvertise the work of laying this conduit either on route A or B, in accordance with the specifications as they had been draughted by you?

A. I answered it in the way I did—contract No. 4——

Q. I refer to contract No. 2?

A. No, sir; at that time there was no effort made to readvertise.

Q. So that after the difficulty with the Moffett, Hodgkins & Clarke Company arose and the claims were presented, which they did present to the executive board, the work was let to Whitmore, Rauber & Vicinus for $1,123,920?

335 A. It was awarded to Whitmore, Rauber & Vicinus at the prices named by them in their proposals.

Q. Which, according to the estimated quantities estimated in the proposal, would have aggregated $1,123,920?

A. Yes, sir; but it should appear on the record that the bid was not for a lump sum.

Q. Do I understand you to say that, in your judgment, this work could have been done for $857,000?

A. Yes, sir.

Q. You don't intend to say that it was done for that amount by the contractors?

A. No, sir.

Q. It cost the contractors a great deal more than that, did it not?

A. I am not prepared to say that, because I have not yet quite completed it.

Q. What is your best judgment upon that?

A. I don't think it cost the contractors very much more.

Q. It did cost them more?

A. I wouldn't say that, because I don't know definitely their prices. I have their prices for some items of the work only by hearsay.

Q. You mean the cost to them, of the work?

A. Yes, sir; as an illustration, I have heard it stated——

Q. You are not in possession of sufficent facts and data to be able to tell how many days' work was required for any particular portion of this work?

A. No, sir.

Q. For instance, how much time was occupied in doing the earth excavation in open trench?

—. No, sir.

Q. And what the cost of that work was?

A. No, sir; I couldn't tell you now.

Q. You cannot give me the details of any other items of the work which were performed, or to be performed, under subdivision
336 D, route B, of contract No. 2?

A. Not completely. For instance, this steel pipe was furnished Whitmore, Rauber & Vicinus by subcontractors. It was laid at an average rate, I think, of half a mile a day by them.

Q. You don't know how much the pipe itself cost them?

A. No, because that was furnished them under a subcontract, and it would be hearsay.

Q. In order to give any information in regard to that, it would be necessary to find how much the rivets cost, and how much the steel cost, and the price paid for doing the riveting?

A. Yes, sir.

Q. You have no data upon that point?

A. I have some data, but it would be perhaps under the head of hearsay—statements given me from the subcontractors. I accepted them as correct.

Q. You cannot say that this work could have been done by anybody, at the time this work was done in fact, at the prices of the bid of the Moffett, Hodgkins & Clarke Co.?

A. Yes, sir; I can say just that very thing, because I had the proposals and bids of subcontractors who would furnish me or you, or any other person, who would put up the necessary security, who would furnish them with the pipe, brick, stone and other materials used in this work, at a certain, fixed, definite price, and, of course, we must accept that statement as a good and valid one.

Q. There are various elements of uncertainty in respect to every contract, which must be taken into consideration?

A. Yes, sir; and, in that, my judgment must be taken with that of the contractor. It is just as good, and no worse. I went through and made an estimate in the same way the contractor did.

Redirect examination by Mr. RODENBECK:

Q. What was the average depth given of the earth excavation in contract No. 2?

337 —. I think, not over eight feet, from the surface of the ground to the bottom of the trench. That is what we call the cutting. We have a technical name, called a cut—that is, going beyond the standard depth. I define it in that way; from the surface of the ground to the bottom of the excavation.

Q. What was the average width?

A. It was four feet on the bottom. That was what was paid for; in some cases, less, but in some cases, more.

Q. Would it be greater on the surface?

A. Yes, sir; depending upon the depth we went, and whether they braced it or not.

Q. Will you state what the price in the complainant's bid, for earth excavation in tunnel, in contract No. 1, was?

A. One dollar per cubic yard.

Q. How many yards?

A. 1,500, earth excavation in tunnel.

Q. You have already stated that they bid $1.50 for the same work in contract No. 2?

A. I think I so stated. I don't remember.

Q. How did the quantities of that work in contracts Nos. 1 and 2 compare, the estimated quantities?

A. They were nearly the same. One was 2,000, in No. 2, 2,000, and 1,500 in No. 1. In contract No. 1, the bulk of the excavation in tunnel was rock excavation, which was 15,500 cubic yards.

Q. Will you state further any information that you had that was open to the examination of contractors and bidders, as to the nature of the soil through which the excavation was to be made—if there is any other knowledge that you had upon the subject?

A. I think I have stated all, under the cross-examination, if it was received.

338 Q. As developed by the prosecution of the work itself, under contract No. 2, can you say whether or not, excavation, earth excavation in open trench, was found to be difficult, or easy excavation?

Mr. Marshall objected, as incompetent and immaterial.

A. I should say it was, on the whole, good excavation, comparatively easy.

Q. Do you know what bid Mr. Mauder submitted for his contract on the excavation through Pinnacle hill?

Mr. Marshall objected as incompetent and immaterial, and that the details of the work are not known.

A. I did look it up at the time, but I don't remember now. I looked over and tabulated his bid for future reference, it being a low bid for tunnel excavation in a sandy soil.

Q. What is your age?

A. I am forty-nine years of age.

EMIL KUICHLING.

Subscribed and sworn to before me on this 22d day of July, 1896.

WM. W. GILBERT,
U. S. Commissioner, Nor. Dist. of N. Y.

THOMAS J. NEVILLE, being duly sworn, testified as follows:

To Mr. RODENBECK:

Q. You are the clerk of the executive board of the city of Rochester?

A. Yes, sir.

Q. You have been such clerk how many years?

A. Since 1876.

339 Q. Your age?

A. Fifty-two.

Q. As clerk of the executive board, did you cause notices of the

proposed letting of the proposed contracts for the new water-works line to be published in the papers?

A. I did.

Q. What papers?

Mr. Marshall objected.

Q. In what papers did you publish it?

A. Published in the local papers.

Q. What other papers did you cause it to be published in?

A. *New York Sun, Tribune, and Herald*, I think.

Q. Do you recollect when the first publication was made in these papers?

A. No; I haven't a definite recollection; preceding the letting of the work some time. I don't remember the date.

Q. Was it made prior to ten days before the letting of the work?

A. Yes, sir.

Q. You were present, and officiated as clerk of the executive board at the time the bids for the work were opened?

A. Yes, sir.

Q. And, as such clerk, you read the various proposals submitted?

A. I did.

Q. Do you recollect what was said at the time that the bid of the complainant was received by the board?

A. I have a remembrance of what was said; yes, sir.

Q. Will you state what occurred in reference to their bid?

A. When I proceeded to read the bids I sorted them according to the order of their numbers, and when I came to this particular bid, the pamphlet I took up wasn't filled out in the same way as the others—as I noticed some of the others had been, and some gentleman present at the time spoke up and said they hadn't had
340 time to conform with the methods pursued by the others in making their bids, and, therefore, they had submitted them in two forms. One, as I recollect, was signed by the contractors, and the other by the sureties.

Q. You mean in two forms, two pamphlets?

A. Two different books. There were two books like this.

Showing book.

I think, if I remember right, tied together in some manner. He explained that the short time that they had to do the thing was the cause of their doing it in that manner.

Q. Will you state when, in reference to the other bids, the bids of the Moffett, Hodgkins & Clarke Co. were read?

A. When this incident that I speak of occurred——

Q. Give me the time as to when their bid was read, whether before or after the other bids?

A. It was read after.

Q. Was the bid of the complainant received and read and treated in the same manner that the other bids presented at that meeting of the board were?

A. Exactly, except the order of time.

Q. You read the complainant's bid yourself?
A. I did.
Q. During the reading of the bid, was there any interruption by any person during the reading of that bid?
A. No interruption whatever.
Q. Did you present the contract No. 2 to the complainant for signature, after the award by the executive board?
A. I think I presented it to Mr. Moffett, in New York.
Q. You went to New York for that purpose?
A. I went to New York and called on Mr. Moffett at the Farmers' Trust Co.
341 Q. What did you have with you at that time?
A. I had the contracts and the resolution, the action of the executive board.
Q. You had the contract No. 2?
A. Yes, sir.
Q. What resolution do you refer to?
A. The resolution adopted by the executive board with reference to letting this contract. I don't recall the substance of it now.
Q. I call your attention to a certain resolution—resolution on pages 131 and 132 of the proceedings of the executive board for 1892–'3, and ask you if those are the resolutions that you presented to Mr. Moffett, or copies of them?

Witness examines resolutions.

A. Those are the resolutions. I would correct my testimony, so far as the contract is concerned, because it hadn't been prepared at that time.

To Mr. MARSHALL:

Q. You didn't present the contract?
A. These resolutions were presented, and whatever was with them. I presume the contract was presented to him.

To Mr. RODENBECK:

Q. The resolutions, you served upon Mr. Moffett?
A. Yes, sir.
Q. The Moffett referred to is the senior member of the firm of the Moffett, Hodgkins & Clarke Co.?
A. He is the gentleman I called for, and he appeared and said he was Mr. Moffett.
Q. Do you recollect whether or not you handed him these contracts at that time and presented them for signature?
A. My impression is that I did.
342 Q. What did Mr. Moffett say to you?
A. He said, in effect, that that is all right, and went to his office.
Q. Did you have any other conversation with Mr. Moffett prior to that?
A. No, sir.

Q. Or with Mr. Burlingame, the engineer of the complainant, prior to the opening of the bids?

A. I had conversation with Mr. Burlingame at the time the bids were about to be presented. He was in the office. I think I had some conversation with him in a general way.

Q. Prior to the presentation of the bids did you have any conversation with Mr. Burlingame?

A. My recollection is that I did, in a general way, have some conversation with him.

Q. Prior to the presentation of the bids?

A. Yes, sir.

Q. Did you ever inform him that this work was to be let to the lowest aggregate bidder?

A. No, sir.

Cross-examined by Mr. MARSHALL:

Q. Your mind is not entirely clear as to all these details in three years and a half?

A. Comparatively so.

Q. You are not prepared to say that you had any conversation with Mr. Moffett when you went to New York?

A. I am.

Q. You are sure you read the resolution?

A. Yes, sir.

Q. In reading the resolution you find that Moffett, Hodgkins & Clarke Company were not required to sign the contract until the 19th of January, 1893—that is a fact, that they were not
343 called upon to appear before the executive board and sign the contract prior to Thursday, January 19th, 1893?

A. I presume so; that is the record, so far as I can remember.

Q. Don't that refresh your recollection that you didn't have the contract with you at the time you went to New York?

A. That is apparently so.

Q. At the time that this meeting took place, at which the bids were opened, there was some talk in reference to the form in which the Moffett, Hodgkins & Clarke Company presented their bids, and some criticism was made?

A. Yes, sir; the criticism was made that the bid should be submitted in the form it was.

Q. That criticism was made by Mr. Aldridge, chairman of the board?

A. I announced when I opened the book that I didn't find the blanks filled out, and Mr. Aldridge, after listening to what I had to say, said, "Lay them aside and go on with the others."

Q. Did you read the bid finally?

A. Yes, sir.

Q. This occurred when the bids on contract No. 1 were opened?

A. All opened together.

Q. You first opened the bids on contract No. 1?

A. Yes, sir.

Q. Then afterwards contract No. 2?

A. I put them in the order of their numbers.

Q. You read all the bids that related to contract No. 1 before you read those that related to contract No. 2?

A. Presumably so.

Q. You are not willing to say that at the time contract No. 2 was read that Mr. Burlingame didn't get up and say there was some mistake made in the bids?

A. I am very positive that he didn't make any statement in regard to any error in the bids.

Q. Are you positive, or is it that you don't recollect any such thing?

344 A. My mind is pretty well fixed on the matter because the question, after the letting, came up then. The claim was made, as I remember, in a general conversation, that an error was made in the contract, whether such protest was made at the time or not. The only protest that was made at that time, that I remember, was the one I have stated.

Q. Isn't it possible that the protest which you refer to in addition was made, and also a correction attempted by Mr. Burlingame at the time of reading the bids?

A. I have no such recollection.

Q. Do you recollect that at the time, a short time after the bids were read, that there was a protest made by the Moffett, Hodgkins & Clarke Company?

A. There was no protest.

Q. They made a protest in writing?

A. I don't remember that. It may be possible.

Q. You don't remember that they made a protest, in writing, on the 3rd?

A. I don't remember it.

Q. I call your attention to a communication received from the Moffett, Hodgkins & Clarke Company (showing paper) that indicates to you that there was some communication from them?

A. Yes, sir; but I don't recollect the communication.

Q. Your mind is not entirely clear as to all the details of this transaction?

A. Not entirely.

Q. It is possible that some protest, or attempt to correct an error, may have been made by Mr. Burlingame which you have overlooked or forgotten?

A. I wouldn't admit that, because that peculiar kind of condition would be of so striking a kind that it would impress itself upon me.

Q. And yet you have forgotten that a written communication was received?

A. There are such a great many received that I wouldn't remember.

345 Q. You kept the minutes?

A. Yes, sir.

Q. You must at some time have written that?

A. Yes, sir.

Q. And yet you have forgotten that?
A. Yes, sir.

Redirect examination by Mr. RODENBECK:

Q. You say you are absolutely certain that during the reading of the bid of the Moffett, Hodgkins & Clarke Company there was no interruption whatever?

Mr. Marshall objected.

Q. Are you absolutely certain that during the reading of the bid of the Moffett, Hodgkins & Clarke Company there was no interruption whatever?

Mr. Marshall objected.

Q. State whether or not there was any interruption during the reading of their bid.

A. I am absolutely clear that there was no interruption, except the matter about the explanation of the duplicate form of the bid.

Q. That occurred before the bid was read?

A. That occurred when I drew the board's attention to it, that it wasn't in the same form as the others, and this gentleman, Burlingame, spoke.

Q. During the reading of the bid itself?

A. The bid was subsequently read. My distinct recollection is that there was no protest or explanation made of the prices submitted by this firm.

Q. You say that your attention was directed to whether or not there was any statement made that there had been a mistake in the bid of the complainant, after the bids were received by the executive board, and read?

346 A. I think that the subject came up the day following, or possibly two days following the reading of the proposals that these parties made. It was generally discussed. I don't know in what form. It was talked that these parties were not prepared to enter into any contract, upon the ground that there was an error.

Q. I call your attention to some evidence on the part of the complainant, given by Mr. Moffett, on page 107½ of the minutes of the stenographer, where he says, in answer to the question: "What was said, in substance, on that subject?"—relating to the question of the irregularity of the bid?

A. After consulting together, I think Mr. Aldridge said "they would read the bid; they would not receive it; they couldn't entertain it, because it was irregular and informal."

Q. Did Mr. Aldridge make any such statement?

A. I don't think he did. He did not, to the best of my memory.

Recross-examination by Mr. MARSHALL:

Q. Do you know Mr. John E. Porter, of Pittsburgh, secretary and treasurer of the Carroll & Porter Boiler and Tank Co.?

A. I met all these gentlemen.

Q. Do you remember he was present?
A. I couldn't say he was.
Q. You wouldn't say he wasn't?
A. No, sir; there was a number of gentlemen there present. I spoke to several of them, and they to me, but I wouldn't be able to state whether he was present at that time, or not.

THOS. J. NEVILLE.

Subscribed and sworn to before me, on this 22d day of July, 1896.

WM. W. GILBERT,
U. S. Commissioner, Nor. Dis. of N. Y.

347 GAYLORD THOMPSON, being duly sworn, testified as follows:

To Mr. RODENBECK:

Q. You are a civil engineer?
A. Yes, sir.
Q. And are at present engaged as chief engineer of the West Side sewer commission?
A. Yes, sir.
Q. How long have you followed that profession?
A. Since 1877.
Q. What experience have you had, as an engineer?
A. I have had experience on railroad work, and for several years connected with the construction of the new aqueduct in New York, and the construction of the water works at the village of Mechanicsville, New York, and on the Rochester water works and the West Side sewer.
Q. You were employed as assistant to Mr. Kuichling in the construction of the new water line for the city?
A. Yes, sir.
Q. You had direct supervision of the construction of contract No. 1?
A. Yes, sir.
Q. Are you familiar with the plans, drawings and specifications for contract No. 2?
A. In a general way.
Q. Are you familiar with the country through which the conduit called for by that contract ran?
A. I am, in a general way.
Q. Have you had experience in making estimates of the cost of constructing work of the character called for by contract No. 2?
A. Yes, sir.
Q. And of making estimates of the cost of making earth excavation in open trenches?
A. Yes, sir.
348 Q. Have you had occasion to make such estimates since you ceased to be in the employ of the city?
A. Yes, sir.
Q. You are not now in the employ of the city of Rochester?
A. No, sir.

Q. I call your attention to subdivision D of route B, contract No. 2—are you familiar with the terms of it?

A. No; I am not.

Q. I will read you the subdivision: "For all earth excavation in open trenches or pits, for the masonry and pipe conduit, entrance, and overflow chambers, gate vaults, blow-offs, pipe overflows, bridges, railroad crossings, creek crossings, and culverts carried under said conduit, including bracing and sheeting, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material and haul of 1,000 feet or less, bailing and draining and all incidental work, the sum of fifty cents per cubic yard." What do you say whether or not the work called for by that subdivision could be done for fifty cents per cubic yard, without a loss?

Mr. Marshall objected, as incompetent and immaterial.

A. I believe that it could be done. There is no question in my mind but that work of that character could be done at a profit, at that price.

Q. Do you know how many yards of earth an ordinary laborer will remove and replace in a trench in a day?

A. Well, they figure on the trench, the cross-section of which I imagine to be 8 or 9 feet average cut, eachl aborer, working in such a trench, including those who do the picking and shoveling, ought to move, on the average, seven or eight cubic yards of material in a day's work.

Q. Do you know what wages were paid to the laborers on this work?

A. No. sir.

349 Q. Do you know what the average wages were for laborers?

A. From $1.35 to $1.50 are the laboring rates; rates that were paid in contract No. 1, for similar work, that I had charge of.

Cross-examination by Mr. MARSHALL:

Q. How do you arrive at your conclusion that the work could be done at a profit at 50 cents a yard?

A. It is a pretty well established fact that laborers will take a trench of a depth of four or five feet with that width, they ought to remove—a laborer will actually move ten cubic yards a day. Below that depth—8 or 9 feet, they will remove about four yards. Take an average of those two, a laborer will remove 7 yards a day at a cost of $1.50. I know that back-filling could be done for about ten cents a yard.

Q. How do you know that?

A. From the number of yards and the price counted on.

Q. I want to know how you get at it?

A. By the amount of work that can be done in a day of that character, depending upon the manner in which it is done; whether it is scraped off by scrapers or shoveled in free hand. Shoveled in

a free-hand way a laborer can shovel in probably twenty yards in a day, back-filling, and ten cents a yard is a pretty good allowance for that.

Q. What else do you calculate?

A. That would be, say, seven yards.

Q. What else has got to be taken in order to arrive at the cost of the excavation?

A. Then I know there is allowance usually, if not always, made by the contractors in estimating on work of fifteen per cent. upon what they figure will be the actual cost to them. This fifteen per cent. is to cover the wear and tear in tools, office help, and things of that sort.

350 Q. What else?

A. That about covers the actual cost to them.

Q. What about hauling the excavated material 1,000 feet?

A. Where it is hauled a 1,000 feet they don't have to back-fill it; that would take the place of the back-filling.

Q. How would they haul it, with wagons?

A. In wagons.

Q. They would have to shovel the excavated material into the wagons and then dump it out of the wagon?

A. Yes, sir; you don't shovel it twice.

Q. Don't that make it more expensive?

A. No; that work is usually done for less than fifty cents, where they don't have to back-fill.

Q. Do you make any allowance for bailing and draining?

A. That allowance is computed from the general character of the ground. The contractor has to judge whether there is to be much of that or not.

Q. Suppose there is much of that, wouldn't that cost something?

A. Supposing there is not any. That probably would be covered in the 15 per cent.

Q. Does the sheeting cost anything?

A. Yes, sir.

Q. What is the cost of that?

A. That would be covered in the 15 per cent.

Q. Does it cost more for the excavation at bridges and railroad crossings than street crossings?

A. They generally cost very much more.

Q. You say you are now employed on the sewer commission?

A. The West Side sewer commission.

Q. That is constructed under the authority of the city of Rochester?

A. No; under a special commission under the legislature. The city has nothing to do with it.

351 Q. Who makes the appointments?

A. The appointment of the commissioners was made by the county judge.

Q. Who appointed you?

A. The West Side sewer commissioners.

Q. Who are they?

A. Horace G. Pierce, Arthur Leutchford and George Swikehard.
Q. You had nothing to do with this route A under contract No. 2?
A. No, sir.
Q. Didn't even go over the grounds?
A. Yes, sir; I have been over the grounds several times.
Q. You made no surveys of the excavation of any sort?
A. No, sir; just saw the work in progress.
Q. A very incidental examination?
A. I was looking for information.

Redirect examination by Mr. RODENBECK:

Q. State whether or not the work called for by contract No. 2 was through rolling country or not?
A. Yes, sir; the country was rolling, up at the other end of it. The cross-section generally was what we call level cross-section.
Q. State whether or not a trench in such a country as that, of eight or nine feet in depth, required any bailing?
A. That depends upon the quantity of water you find. Along through there it is a rather dry country.

Recross-examination by Mr. MARSHALL:

Q. A good deal of this line was along Honeoye creek?
A. Yes, sir.
352 Q. There were probabilities that the water would lodge in the creek?
A. Portions of it.
Q. Of course there were numerous places where you might expect the necessity of building a drain?
A. Yes, sir.

Redirect examination by Mr. RODENBECK:

Q. State whether or not any extra compensation was allowed for bailing and draining at creek crossings to the contractor.

Mr. Marshall objected upon the ground that the contract will show for itself.

GAYLORD THOMPSON.

Subscribed and sworn to before me on this 22nd day of July, 1896.

WM. W. GILBERT,
U. S. Commissioner, Nor. District of N. Y.

EDWIN A. FISHER, being duly sworn, testified as follows:

To Mr. RODENBECK:

Q. At present you are the city engineer of the city of Rochester?
A. Yes, sir.
Q. You were formerly employed as an assistant of Mr. Kuichling in the construction of the new conduit?

A. For the last three years.

Q. What experience have you had as an engineer?

A. About six years' experience in water works and bridge-work foundations, and about twelve years on railroad work, loca-
353 cation and construction and maintenance of way, and about four years in railroad superintendence, making in all about 25 years.

Q. You took part in the preparation of the plans and specifications for the work called for in the construction of the new conduit?

A. To some extent.

Q. You are familiar with those plans and specifications?

A. Yes sir.

Q. You have had occasion to go over the route?

A. Yes, sir; I had direct charge on the contract No. 2, after the 1st of June, 1893.

Q. You know, from borings, the character of the soil through which the conduit ran?

A. Yes, sir.

Q. You assisted in the location of the route?

A. Yes, sir.

Q. You know of the character of the excavation from actual observations during the progress of the work?

A. Yes, sir.

Q. Have you stated whether or not you know the character of the soil, from borings made?

A. Yes, sir.

Q. You have had occasion to make estimates of the cost of earth excavations in open trenches?

A. Yes, sir.

Q. Do you know the work called for by subdivision D, in contract No. 2, which I read to Mr. Thompson?

A. Yes, sir.

Q. Do you know what the cost would be for doing that work?

Mr. Marshall objected, as immaterial and incompetent.

A. Yes, sir.

Q. What do you say, as to whether or not, the work called
354 for by subdivision D, referred to, could be done for 50 cents a yard in the bid submitted by the complainant without a loss.

Mr. Marshall objected as before.

A. I should say it could.

Q. Do you know whether bids have been submitted for similar work by contractors in this city?

A. Yes, sir.

Q. Will you state what bids have been submitted for work done in the city similar to this work called for by subdivision D?

Mr. Marshall objected, as immaterial and incompetent and too general.

A. In 1894—in August and September, 1894, there were contracts let for the work of excavating and refilling for a 36-inch cast-iron pipe conduit in this city, at 36 cents per cubic yard; excavating and back-filling, the second section for 35 cents, and one for 42 cents and another section for 45 cents.

Q. That would include the necessary bracing and sheeting?

Mr. Marshall objected upon the ground that the contract itself, for which the work was done, would be the best evidence.

Q. Do you know what the work was?

A. Yes, sir; that was substantially the same work as was included in contract No. 2.

Cross-examination by Mr. MARSHALL.

Q. Do you know when that work was done?

A. Yes, sir; in 1894.

Q. Who did it?

A. Brayer and Albaugh did one section, and Chambers & Casey the other.

355 Q. The same work as involved in this litigation?

A. Yes, sir.

Q. Where was the work done?

A. The section that Chambers & Casey had of this extended from Mount Hope reservoir through park and private lands to Mount Hope avenue, and down Mount Hope avenue and McLean place to the river, a distance of something over a mile.

Q. Where was the other work?

A. The first section that was laid for 35 cents, commenced at the Mount Hope reservoir, and ran across park lands to Meigs street, and from Meigs street up Averill street, I think.

Q. Have you a copy of those specifications?

A. Not with me.

Q. The work was not as extensive as the work involved in this action?

A. No; the work done by Brayer & Albaugh was three or four miles.

Q. The character of the country was different, also—it went through streets mostly?

A. Mostly.

Q. The difficulty in hauling was not as bad as it is in the open country?

A. There was very little hauling to be done in both cases.

Q. What was the principal part of the work—back-filling?

A. Excavating and back-filling.

Q. You don't know anything about the results to the contractor who did that work?

A. No, sir.

Q. Was that work let by the executive board?

A. Yes, sir.

Q. You have been in the employ of other railroad companies or municipalities?

A. Yes, sir; I have not figured on work in my own name, but have figured on work for others.

356 Redirect examination by Mr. RODENBECK:

Q. State whether or not Chambers & Casey bid on contract No. 2.

Mr. Marshall objected.

A. They did not.

E. A. FISHER.

Subscribed and sworn to before me on this 28th day of July, 1896.

WM. W. GILBERT,
U. S. Commissioner, Nor. Dist. of N. Y.

FREDERICK C. LAUER, JR., being duly sworn, testified as follows:

To RODENBECK:

Q. What is your business?
A. Contractor.
Q. You have been engaged in that business, in that line of work, how many years?
A. Twenty-two or twenty-three years.
Q. In this city and vicinity?
A. Yes, sir.
Q. You are a member of the firm of Lauer & Hagaman, contractors?
A. Yes, sir.
Q. You are familiar with the work called for by contract No. 2, for the construction of a new conduit for the city?
A. Partially.
Q. Did you go over the line?
A. I did.
Q. Did you examine the results of the borings?
A. Yes, sir.
Q. For what purpose did you make an examination of the boring along over the line?
A. We figured on the work.
357 Q. You didn't submit, however, a bid on the work?
A. We were interested, but not in this section.
Q. Not in contract No. 2?
A. No, sir.

To Mr. MARSHALL:

Q. Which were you interested in?
A. Contract 1.

To Mr. RODENBECK:

Q. Do you know the character of the earth excavation in open trenches, called for by contract No. 2?

A. Yes, sir.
Q. Are you familiar with that work called for?
A. I didn't see the work while it was in progress, but I know only from observation, going over the line.
Q. And from the borings made by the engineer?
A. Yes, sir.
Q. Bids were submitted by the various contractors on the work?
A. Yes, sir.
Q. Are you familiar with the requirements of subdivision D of contract No. 2, which has been read to some of the witnesses—earth excavation in open trenches, contract No. 2?
A. Yes, sir.
Q. Do you know what the work called for by that subdivision would cost?
—. I can give an estimate on it of my own.
Q. What do you say, as to whether or not, the work called for by that subdivision could be done for 50 cents a cubic yard?

Mr. Marshall objected, as immaterial and incompetent, and that the witness is not shown to be sufficiently familiar with the locality and work.

A. I should say it could be.
Q. Can you say whether or not it could be done for that price, without a loss?

358 Mr. Marshall objected, the same as before.

A. It could.

Cross-examination by Mr. MARSHALL:

Q. You didn't make any bid on the work called for by contract No. 2?
A. No, sir.
Q. You made no preparations for making one?
A. Yes, sir; we figured on it.
Q. Did you go over the ground?
A. Yes, sir.
Q. With whom?
A. Mr. Hagaman, Mr. Jones and some engineer that Mr. Kuichling sent over the line with us.
Q. Who is Mr. Jones?
A. He was contracting for section 1.
Q. Were you interested in any of the bids that were presented to the board under contract No. 2?
A. No, sir.
Q. You concluded not to present a bid?
A. We concluded not to present a bid.
Q. Although you did present a bid on contract No. 1?
A. Yes, sir.
Q. What was your reason for not presenting a bid on contract No. 2?

A. At the time we took hold of it, we couldn't get satisfactory prices on material and pipe.

Q. Didn't have time to prepare yourself?

A. No, sir.

Q. When did you begin to make your investigations, for the purpose of making a bid?

A. I couldn't tell you; a few days before the letting.

Q. How many days?

A. I don't remember.

359 Q. Mr. Jones was with you at the time?

A. Yes, sir.

Q. He had been over the ground before, hadn't he?

A. I think not.

Q. He had prepared himself to make a bid on section No. 1?

A. He didn't figure on 2. He didn't make any bid on the two. I think not. He put in a bid on No. 1.

Q. The work on contract No. 1 was awarded to Jones, wasn't it?

A. Yes, sir.

Q. How much earth excavation was there on contract No. 1?

—. I don't know.

Q. What was the character of that excavation?

A. I could not say.

Q. You weren't very careful in regard to it?

A. Yes, sir.

Q. The bid that you put in, did you consider it a pretty fair bid?

A. We considered it was.

Q. You didn't get the contract?

A. If we had more time, we probably would have reduced our bid. We talked that matter over afterwards.

Q. You didn't intend to put in an extravagant bid?

A. We intended to put in a safe bid, for the time we had to look matters up.

Q. You considered $1.25 for earth excavation in open trench as high?

A. We bid high.

Q. And, yet, you think a man wouldn't lose anything by doing it for 50 cents?

A. Yes, sir.

Q. Yet, you think it could be done for 50 cents?

A. In making bids, we don't always put it where it belongs. We transpose our figures. If we didn't do that everybody would

360 know our figures. We were high on that, because we didn't have time to satisfy ourselves on the other figures.

Q. Have you done any work in excavation?

A. Yes, sir.

Q. On the water works?

A. Yes, sir; not on this.

Q. You didn't have any work on this contract, as subcontractor under Whitmore, Rauber & Vicinus?

A. No, sir.

F. C. LAUER, JR.

Subscribed and sworn to before me, on this 22d day of July, 1896.

WM. W. GILBERT,
U. S. Commissioner, Nor. Dist. of N. Y.

EMIL KUICHLING, being recalled as a witness, testified as follows:

To Mr. RODENBECK:

Q. You stated on your previous examination that you were unable to state that any work of earth excavation, such as called for by subdivision D, contract No. 2, has been done in this city for fifty cents, or less—do you wish to qualify that statement?

A. Yes, sir; I wish to state that in my reply I had in mind a time prior to 1893. Since then work has been done under my direction at a much less figure.

Mr. Marshall objected and asked to have the answer stricken out.

Q. The work done by Mr. Fisher was done under your supervision?

361 A. Yes, sir. It is proper for me to state that I ought to know what work was done under my supervision.

EMIL KUICHLING.

Subscribed and sworn to before me on this 22nd day of July, 1896.

WM. W. GILBERT,
U. S. Commissioner, Nor. District of N. Y.

Adjourned.

United States Circuit Court, Northern District of New York.

THE MOFFETT, HODGKINS & CLARKE COMPANY
against
THE CITY OF ROCHESTER and GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester.

STATE OF NEW YORK,
County of Monroe, City of Rochester, } ss:

I, William W. Gilbert, United States commissioner, hereby certify that the above witnesses Emil Kuichling, Thomas J. Neville, Gaylord Thompson, Edwin A. Fisher and Frederick C. Lauer, Jr.,

362 were by me first duly sworn to testify the truth, the whole truth and nothing but the truth; that their depositions were reduced to writing by E. Darwin Smith in the presence of said witnesses respectively and when completed read over to said witnesses respectively and subscribed by them in my presence and in the presence of such of the parties and counsel as attended; that said depositions were taken pursuant to the annexed stipulation at the office of the corporation counsel of the city of Rochester at Rochester, N. Y., on the first day of July, 1896; that the parties were

represented at the taking of said depositions by their respective counsel as set forth, and I am not of counsel or attorney or relative of either party or otherwise interested in the event of this cause.

[L. S.] In testimony whereof I have hereunto set my hand and official seal this twenty-ninth day of July, 1896.

WM. W. GILBERT,
United States Commissioner, Nor. District of N. Y.

363 *Stipulation.*

NEW YORK, *November* 14, 1896—10 a. m.

Present: Mr. Marshall, for the plaintiffs; Mr. Rodenbeck, for the defendants.

United States Circuit Court for the Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY
against
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester.

It is hereby stipulated between the counsel for the respective parties herein that the testimony of A. Fteley, witness for the defendants herein may be taken before B. Benjamin Schiff, as notary public, the testimony of said witness being taken stenographically before Ernest C. Kieb; that three copies of said testimony be made by the stenographer, the expense being equally divided between the parties hereto, the prevailing party to tax as an item of expense the amount advanced.

Dated New York, November 14, 1896.

JENNY & MARSHALL,
Attorneys for Complainants.
A. J. RODENBECK,
Attorney for Defendants.

364 ALPHONSE FTELEY, being duly sworn on behalf of the defendants and examined by Mr. Rodenbeck, testifies:

Q. You reside where?
A. In New York.
Q. And you are an engineer by profession?
A. Yes, sir.
Q. You have followed that profession for how many years?
A. Thirty years.
Q. Will you state what experience you have had in that profession?
A. I had general practice until 1867, when I devoted my services particularly to hydraulic works, such as the construction of water works, sewers, etc. My principal employment as an active engineer in charge of the works has been in Boston from 1873 to 1882, as en-

gineer in charge of the construction of the Sudbury River water works; also in the capacity of assistant to the chief engineer of all the works of the city of Boston, including the last half of the work on what is called the improved sewerage work. My second employment has been with the aqueduct commission of the city of New York, for whom I am now acting as chief engineer and whom I have served since 1884. Besides these various employments I have been consulted by other cities and by other parties in various capacities for general works, such as water works and sewerage works.

Q. Will you state what experience you have had in connection with water works more particularly?

A. The whole construction of the Sudbury water works in Boston was entirely under my charge; and all of the work for the new aqueduct for New York city has been designed by me, and I have constructed it. At first I was employed in the capacity of assistant to the chief engineer, and for the last seven years I have acted as chief engineer.

365 Q. You have been consulted in various other cities in connection with the construction of water works?

A. Yes, sir.

Q. Will you name some of them?

A. I would name for the State of Massachusetts, Boston, Worcester and Newton; and in this State, Brooklyn, Newark, Jersey City, Buffalo, Rochester, and elsewhere, Cincinnati and Washington, and various other places.

Q. You have been connected with the construction of the additional water supply for the city of Rochester?

A. Yes, sir.

—. What has been your connection with the development of that supply?

A. I was originally called upon by the chairman of the chamber of commerce to give my advice to them as to certain proposed work which was to be done. I think that was about 1888, or about that time. I was afterwards consulted by a joint committee of the chamber of commerce and the city council of the city of Rochester, and afterwards I was retained, in 1892, by the executive board of the city of Rochester as consulting engineer for the proposed plan and specification of the work, and also to advise the board about the construction of the work.

Q. So that from 1888 down to 1893 you have been more or less continuously interested in the development of the water supply of the city of Rochester?

A. Yes, sir.

Q. Are you familiar with the route of the new conduit of the city of Rochester?

A. Yes, sir.

Q. And somewhat familiar with the country through which it passes?

A. Yes, sir.

Q. You have been over the line?

A. I have driven over the line a number of times.

Q. And are you familiar also with the plans, drawings and specifications for the construction of the new conduit?

A. I am.

366 Q. What connection did you have with those plans, drawings and specifications?

A. The drawings and specifications were submitted to me for my criticism and approval; and especially in regard to the specifications for the contract I have been in conferences with the chief engineer before the final form was accepted; and as to the plans they were submitted to me, and I looked them over, but I had not so much criticism to make of them, because I generally approved of them.

Q. Did you approve of the plans, drawings and specifications upon which the work was finally constructed?

Objected to as immaterial and incompetent.

A. I did.

Q. Did you approve of the plans, drawings and specifications upon which proposals were asked for?

Objected to as immaterial and incompetent.

A. Yes, sir.

Q. I call your attention, Mr. Fteley, to Complainants' Exhibit 1 A and 1 B, and particularly to subdivision D of route B, being contract No. 2 for the construction of the new conduit, and ask you if you are familiar with the work which is called for by that subdivision.

A. I am; yes, sir.

Q. Do you know the market value of such work as that?

A. Yes, sir.

Q. Do you know what the market value of such work was at the time the proposal of the complainants herein was made in the latter part of the year 1892?

A. Yes, sir.

Q. What do you say was the fair market value of such work at the time the complainants herein made their bid in the latter part of 1892?

367 Objected to as indefinite.

A. From 50 to 55 cents a cubic yard.

Q. State whether or not you made an analysis of the bid submitted by the complainants herein, after the bid was received by the executive board of the city of Rochester, and before the contract was awarded to them.

A. I did.

Q. State whether or not that analysis was made for the purpose of determining whether or not the work could not be done for the bid which had been submitted without a loss to Moffett, Hodgkins & Clarke Company.

Objected to as indefinite and immaterial.

A. The analysis was made not wholly for that purpose, but in order that I might advise the board as to what course they should follow after receiving the bids.

Q. You did make an examination and analysis of their bid?

A. I did.

Q. Assuming good management and fair weather conditions, what do you say as to whether or not the bid submitted by the complainants for contracts No. 2, being Complainants' Exhibits 1 A and 1 B, was sufficient to cover the cost of the whole work?

Mr. MARSHALL: I object to that on all the grounds before stated, as immaterial, incompetent, indefinite, and inadmissible under the pleadings, and based upon a hypothesis not established by the evidence.

A. Under favorable conditions, yes.

Q. Was that conclusion reached by you at the time of your examination of the bid?

Same objection.

A. Yes, sir.

368 Q. Are you of the same opinion still?

Same objection.

A. More so.

Q. I direct your attention to item X, route A, page 18 in Complainants' Exhibit- 1 A and 1 B, and also item G G, route B, page 30, being their bid on 36-inch cast-iron pipe, and ask you what you say as to whether the bid submitted by them represents the fair market value of the work called for?

Mr. MARSHALL: Objected to as immaterial and incompetent, and inadmissible under the pleadings on the ground that the contract which is here involved is not a contract for cast-iron pipe.

A. I consider the price is more than 50 per cent. above the market price.

Q. State whether or not you regard that price as an unbalanced bid upon that work.

Mr. MARSHALL: I object to that on all the grounds above stated, and on the further ground that it is not a proper subject for opinion in the evidence, and that so far as the two clauses to which reference have been made, namely, X and G G, are concerned, they do not enter into the controversy here at all; that this is not a contract claimed to have been awarded to the complainants for cast-iron pipe.

A. It is unbalanced from the fact that the price is more than 50 per cent. above the market price, so far as cast-iron pipe is concerned.

Q. I call your attention to another item, item R, route B, page 28 in the same exhibit, being for brick masonry laid in Portland cement, tunnel and shafts. What do you say as to whether or not

the price bid upon that item represents the fair market value for the work called for by the contract?

369 Same objection.

A. It is nearly three times as much as the market price.

Q. Do you regard that also as an unbalanced bid upon that work?

Same objection.

A. I beg your pardon; it is not quite three times as much; it is two-and-a-half times as much.

Q. Do you regard that also as an unbalanced bid upon that work?

Same objection.

A. Yes, sir.

Q. Will you examine item J, route A, page 16; also item P, route B, page 28, being for brick masonry, Portland cement, open excavation, in the same exhibit, and state whether or not the price bid represents the fair market value for the work called for by those items?

Same objection.

A. It is much above the market price.

Q. State whether or not you regard the bid submitted by complainants on contract No. 2, considered as a whole, an unbalanced bid or not.

Mr. MARSHALL: I make the same objection on all the grounds heretofore stated, as improper, incompetent and immaterial, no sufficient data having been given for the expression of such an opinion; that the basis heretofore stated by the witness for the expression of his opinion is founded upon elements which are not material to the contract which is claimed to have been awarded by the city

370 authorities of Rochester to the complainants in this action, and also as indefinite and too general.

A. Yes; from the fact that some of the prices are away above the market prices while others are below or very close to the market price.

Q. Will you please explain what is meant by the term "an unbalanced bid"?

A. By an unbalanced bid is meant a bid in which the figures, instead of presenting about the figure of the market price for the various commodities shows prices which vary up and down, either above or below the said market prices for certain purposes. They may vary according to certain conditions.

Q. Is it a fact that contractors in competing on public works sometimes vary their figures, putting a price on some items in excess of the market value and putting a price on some items below the market value, still preserving the aggregate price on their whole bid?

Objected to as too general, indefinite, incompetent and immaterial, not a proper subject for an opinion; and what some contractors do is not of any importance whatever in this controversy.

A. It is sometimes done.

Q. And what is the purpose for submitting bids of that kind?

Objected to as incompetent. I object to the witness stating what other people have in mind when they do certain acts which are not involved in this controversy; and the intention and purposes of contractors generally are not involved here, and are not proper subject for the opinion of a witness in evidence.

371 A. It may be due to various reasons; it may be due to the fact that contractors do not like to disclose to their fellow-bidders the prices at which they can do the work, owing possibly to some peculiar advantages which they may have. Another very strong reason for it is that sometimes a contractor has not very much capital and he likes to charge a very much higher price for a portion of the work which is to be done first, so that he can secure a margin of capital with which to do the balance of the work.

Q. Is it quite usual for contractors to submit bids on public works, varying the figures on bids for particular items which have been called for by the contract?

Same objection.

A. It is quite frequently done.

Cross-examination by Mr. MARSHALL:

Q. How often did you visit this work in Rochester during the construction?

A. Four or five times.

Q. And how often before construction began?

A. About as many times.

Q. You were merely consulting engineer?

A. Yes, sir.

Q. Whatever you did was in consultation and conference with Mr. Kuichling, the engineer in charge?

A. It was.

Q. Did you prepare the specifications or did Mr. Kuichling?

A. Mr. Kuichling did.

Q. And all you did was to express your views to him with respect to the plans and specifications?

A. I did more than this, because when the specifications were first presented to me there was a good deal of consultation, in fact I had many consultations with Mr. Kuichling with regard to the

372 form of the specifications, and the form of the specifications was somewhat altered, possibly in view of the discussion that we had in regard to the matter.

Q. Were you at Rochester at the time when these bids were presented?

A. I was there shortly after.

Q. It was at that time that you were called into conference by the executive board?

A. It was.

Q. At what stage of the proceedings were you called into conference?

A. The bids had been received, and no action had been taken, so far as I know, and the board desired to ascertain Mr. Kuichling's and my opinion in regard to the bids as presented.

Q. You knew, of course, that there was an injunction obtained by the complainants?

A. I knew it afterwards.

Q. Did you know it at the time?

A. There was no injunction at that time.

Q. So that you were called into conference before the injunction was obtained?

A. Yes, sir.

Q. Subsequently you learned that there was an injunction obtained?

A. Yes, sir.

Q. And after that injunction had been obtained, were you called into conference by the board?

A. No.

Q. Did you confer with Mr. Kuichling?

A. Yes, sir.

Q. You learned, of course, that the contract was awarded subsequently to Whitmore, Rauber & Vicinus?

A. Yes, sir.

Q. Mr. Kuichling conferred with you on that subject?

A. Hardly so. I had conversations and consultations with him, but I had no influence upon his action at all, but I heard afterwards.

Q. You did not make any objection to that contract having been awarded to Whitmore, Rauber & Vicinus?

A. No, sir.

373 Q. You made no protest, as consulting engineer?

A. I made no protest, because the contract was awarded before I knew anything about it.

Q. And after it had been awarded you made no objection?

A. No.

Q. Do you know what their contract aggregated?

A. One million one hundred thousand and some odd dollars.

Q. The contract which was awarded to them was on which route, do you recollect?

A. Route A.

Q. Do you know how much larger that amount was than the amount of the contract price for route B given by the Moffett, Hodgkins & Clarke Company?

A. I would have to consult the tables. I see here that it was $857,552.52.

Q. And the Whitmore, Rauber & Vicinus bid on route B was what?

A. $1,130,195.

Q. And what was the bid of Whitmore, Rauber & Vicinus on route A which was awarded to them?

A. $1,123,920.

Q. Were you consulted on the subject as to whether route A or route B should be the route adopted?

A. No, sir.

Q. Do you know the differences between those two routes?

A. Yes.

Q. The amount of the Moffett, Hodgkins & Clarke bid on route A you have given?

A. I don't believe you have asked me for that.

Q. What was the amount of that bid?

A. $903,324.

Q. You have observed, have you not, that the quantities of open earth excavation in trench on both routes is identical?

A. Yes, sir.

374 Q. Your attention was called to item X on route A of some cast-iron pipe. State what was the quantity of cast-iron water pipe which was estimated by the engineers?

A. It was a very small quantity—100 feet.

Q. You had also your attention called to the item G G in route B which is exactly the same item as item X in route A to which your attention has just been called?

A. Yes, so I understand.

Q. And the quantities are the same?

A. Yes, sir.

Q. You have stated that the price charged by Moffett, Hodgkins & Clarke Company in their proposal was larger than the market price?

A. Yes, sir.

Q. What do you say was the market price for that?

A. Below $6.

Q. How much below?

A. I cannot say exactly. I believe it came to $5.80. I called it $6.

Q. You mean by that that you made a calculation by which it came to $5.80?

A. Yes, sir.

Q. When did you make that calculation?

A. Yesterday.

Q. Where did you make it?

A. Here in New York.

Q. In your office?

A. No, sir; I made it in conference with Mr. Rodenbeck.

Q. Mr. Rodenbeck, the corporation counsel?

A. Yes, sir.

Q. How did you make that calculation?

A. I took the price, as I recollected it, of the cost of iron pipe furnished in the vicinity on or about the same time, and I applied it to this pipe here, and I found that $6 was about fair.

Q. You based your calculation on your recollection of the prices which prevailed at the time?

A. Yes, sir.

375 Q. You had no written data for that?
A. No, sir.
Q. You had no printed data?
A. No, sir.
Q. And you had no price-list of any kind?
A. No, sir.
Q. Then it was based simply on your good memory?
A. I knew the prices at that time in the profession.
Q. But it was all the result of memory, without data, either written or printed, from which you might refresh your recollection
A. Not when I made that calculation.
Q. The next item to which your attention was called was item R on route B, page 28. That is for what work?
A. Brick masonry open work.
Q. What were the quantities of that?
A. 500 yards.
Q. There was none of that work on route A, was there?
A. No, sir.
Q. What data have you which you can state as to what the value was at the time, at the place where that work was done, for that kind of work?
A. Brick-work being done under my own direction at the same time.
Q. Have you any written data as to the cost of that work?
A. Not with me now, no sir.
Q. Do you know at what particular place on the line this work was done?
A. This was to be done in the tunnels and shafts.
Q. Where were those tunnels and shafts?
A. In case there were tunnels and shafts, this brick-work would have gone into the structure.
Q. How much is that work worth, according to your judgment at that time?
A. $12 per cubic yard.
376 Q. Do you know what that kind of work was bringing in Rochester and its vicinity about that time—what price?
A. Yes, sir, I do.
Q. Did you know of any such work as that being done there?
A. I did not keep any note of it but my recollection is that brick-work was being done for $10 per cubic yard on sewer-work.
Q. Do you have any personal knowledge of any work of that kind being done at or about that time?
A. No, sir, not from actual knowledge.
Q. You did not know what any contractor paid for that kind of work on or about that time in or about Rochester?
A. No, sir—not from actual knowledge.
Q. Then it was mere hearsay on your part?
A. It was entirely from hearsay.
Q. What was the quantity of brick masonry laid with Portland cement which was estimated on line A?
A. 200 yards.

Q. What do you say was the fair market value of that work at that time?

A. The same as for tunneling and shafting, as I said before, $12.

Q. You do not make any difference then between those two classes of work?

A. No, sir.

Q. The next item to which your attention was called on your direct examination was item P on route B, which was also for brick masonry laid with Portland cement. What was the quantity for that kind of work which was estimated for route B?

A. 400 cubic yards.

Q. And your answer as to what you consider the fair value for that kind of work is the same as you previously made?

A. Yes, sir.

Q. In answer to one of the questions of counsel you stated that there were some items upon which a bid was made by Mof-
377 fett, Hodgkins & Clarke Company which were below market price?

A. Yes, sir.

Q. Will you specify some of those items?

A. The first is the item of $1.50 for earth excavation in tunnel.

Q. How much did they charge for that?

A. $1.50.

Q. And how much did Whitmore, Rauber & Vicinus charge for that?

—. $15.

Q. Was $15 what it was reasonably worth?

A. No, sir.

Q. And you think it was worth a good deal more than $1.50?

A. Yes, it was worth about $5.

Q. Wasn't it worth more than $5?

A. No, sir.

Q. The Carroll-Porter Boiler and Tank Company charged $12 for that work?

A. Yes, sir.

Q. And so did the Rochester Construction Company?

A. They charged $10.

Q. What was the quantity of that earth excavation in tunnel?

A. 2,000 yards.

Q. What other items of that character did you observe?

A. The price for single-riveted conduit pipe.

Q. How much did they bid for that?

A. $4.35 for quarter inch, $5.44 for five-sixteenths inch thick, and $6.50 for three-eighths inch thick.

Q. You have stated that according to your idea the value of earth excavation in open trench was from fifty to fifty-five cents per cubic yard?

A. Yes, sir.

Q. Have you observed that Whitmore, Rauber & Vicinus charged seventy-five cents for that?

A. I have.

Q. And that the Carroll-Porter Boiler and Tank Company charged eighty-five cents?

A. Yes, sir.

378 Q. And that the Rochester Construction Company charged eighty cents per cubic yard?

A. Yes, sir.

Q. You also observed that Moffett, Hodgkins & Clarke Company charged seventy cents on route A for that same work?

A. Yes, sir.

Q. And the quantities on route A and route B are identical for that work?

A. Yes, sir.

Q. I call your attention to the proposal of Moffett, Hodgkins & Clarke Company, Exhibit 1 A, and ask you if you observe that "fifty cents" was originally written in under subdivision D, which was the proposal for earth excavation in open trench, and that those figures were stricken out and "seventy cents" were inserted in words and figures.

Objected to on the ground that the exhibit itself shows what the fact is; on the further ground that it does not appear that Mr. Fteley knows anything about the subject as to whether the change was made, when it was made, or how it was made.

A. It appears so on page 15.

Q. And the handwriting of the words "seventy cents" is the same as the handwriting of "fifty cents"?

A. Yes, it appears so.

Q. You never had any of that sort of work done in Rochester, earth excavation in trench, have you?

A. Not under my own direction.

Q. You had no personal knowledge as to what that sort of work actually cost in that vicinity at that time?

A. I had personal knowledge to the extent that I made some inquiries at the time I first reported to the city as to the cost of the proposed work. I made some inquiries then in order to make an estimate of my own to the city.

379 Q. And that does not involve your actually doing that work, or the settling with contractors and laborers?

A. No, sir; but I made inquiries as to the cost of that kind of work.

Q. And what you ascertained then was mere hearsay information?

A. Yes, sir.

Q. Of course you knew that the work was to be done largely in the country?

A. Yes, sir.

Q. At some considerable distance from railroads and from the city of Rochester?

A. Yes, sir.

Q. And you knew, too, that this proposition included hauling?

A. Yes, sir.

Q. Do you know for what distance?

A. The most of that earth was used over the pipe in the vicinity, and the maximum haul was about 1,000 feet.

Q. And that included bailing and draining?

A. Yes, sir.

Q. The city of Rochester paid Whitmore, Rauber & Vicinus for that same work 75 cents?

A. Yes, they paid a pretty high price.

Q. They did pay 75 cents?

A. Yes, so far as I understand it.

Q. You have no written data or memoranda showing what the cost of that work would have been at that time?

A. No, sir.

Q. And your recollection is from such inquiries as you made as to the cost of that work that it would have been from 50 to 55 cents?

A. From my own knowledge and inquiries. I did not say "cost," I said "market price." The cost would be less than that.

Q. You say that you made an estimate or calculation, and that from that calculation you decided and determined that under
380 favorable conditions the contractor could have done the work at the aggregate price bid by the Moffett, Hodgkins & Clarke Company?

A. Yes, with a slight loss on steel-work and a profit on the earth-work.

Q. And how about the other items?

A. There would have been a large profit on various items—on the items which I have already enumerated, which were above the market price, and some of the others seemed to be generally up to what I would expect to be paid.

Q. Would not there have been a loss on earth excavation in tunnel?

A. Yes, sir.

Q. How much of your estimate would be profit on the earth-work?

A. The profit on earth-work would have been from five to ten cents per yard under those conditions.

Q. On a bid of 50 cents?

A. Yes, sir.

By Mr. RODENBECK:

Q. You mean for earth excavation in open trenches?

A. Yes, sir.

By Mr. MARSHALL:

Q. And how much did you estimate to be the loss on water pipe?

A. Something more than to balance the profit on the earth-work.

Q. Can't you give me an idea as to the figure?

A. It was something like five per cent. over and above that price. That I call the cost price of the steel.

Q. That is the cost price of the steel would have been five per cent. over and above their price?

A. Yes, sir.

Q. So that the result of all your calculations would have shown a loss to the Moffett, Hodgkins & Clarke Company?

381 A. No, sir; my calculation showed, as I said before, that under favorable circumstances they might have squared their figures.

Q. By that you mean that they could have pulled through?

A. They might have pulled through.

Q. Outside of the steel-work the largest item is earth excavation in trenches?

A. Yes, sir.

Q. The aggregate price that the Moffett, Hodgkins & Clarke Company charged for that work on route A was $128,800, and the price paid to Whitmore, Rauber & Vicinus was $138,000?

Objected to on the ground that there is nothing to show what the city paid to Whitmore, Rauber & Vicinus.

The summary from which the counsel has read has not been introduced in evidence, and is merely an approximate estimate.

A. Yes, it appears so on the schedule.

Q. Do you know what the actual amount of the work was?

A. I know what it was pretty nearly.

Q. It was approximately the amount of your estimate?

A. Yes, it was approximately the amount of my estimate.

Q. There was no earth excavation in tunnel on route A at all?

A. No, sir.

Q. What was the first work that was done on a contract of this character?

A. The first work to be done is to break the surface of the ground, and to form the routes and general grading of the ground over the proposed line, to excavate the trenches proper for the pipe, and last of all to lay the pipe therein.

Q. Then, of course, one of the first things to be done is to make the earth excavation in open trenches?

382 A. Yes, sir; in the meantime the contractor may have ordered the steel at the rolling mills, as they must order it before they can proceed with their work.

Q. But the order of the work is to make the excavation before you construct your pipe?

A. Yes, sir.

Q. And this pipe which was contemplated to be laid on these different routes was pipe made along the line of the work?

A. Yes, sir.

Q. That is to say the steel sheets were sent to the ground, and then they were bent and riveted together at or near the trench?

A. They were bent and riveted at or near the works for certain lengths of pipe; and then these certain lengths of pipe would be taken to the trench and then riveted in the trench.

Q. That is the ends were riveted together?

A. The ends of the ultimate lengths were riveted together.

Q. Of course you never made any contract personally in Rochester, or that vicinity, in or about the years 1892 or 1893 for the doing of this kind of work?

A. No, sir.

Q. You did, as I understand you, examine the work while it was in progress under the contract which was let to Whitmore, Rauber & Vicinus?

A. Yes, sir.

Redirect examination:

—. I want it to appear on the record, if it does not already so appear, that your estimate of 50 to 55 cents for earth excavation in open trenches is your estimate of the market value of the work at that time.

Objected to on the ground that it has not been shown that the witness had any knowledge of the market value of such work, and as immaterial and incompetent.

A. Yes, sir.

383 Q. The cost of that work would be much less than that?

Same objection.

A. Yes, sir.

Q. You have already stated what the cost would be?

A. I have.

Recross-examination:

Q. How long did your connection with this work continue?

A. I was engaged as consulting engineer of the board in 1892, in the month of July, and my services lasted until the end of 1894.

Q. That was the time when the work was completed by Whitmore, Rauber & Vicinus?

A. It was substantially completed.

Q. And I suppose during that interval you were in constant communication with Mr. Kuichling, the engineer in charge?

A. Yes, either by correspondence, or by personal conference there. I had occasion also to see the members of the board several times.

Q. But notwithstanding that you were not consulted by either Mr. Kuichling, or by the board, after you learned that an injunction had been obtained by the Moffett, Hodgkins & Clarke Company against the executive board of the city of Rochester, and before the time the contract was awarded to Whitmore, Rauber & Vicinus?

A. No, sir; I had nothing to do with that.

Q. They did not confer with you on the subject of the advisability of having a new letting?

A. Yes, but that was previous to the injunction.

Q. You say that was previous to the injunction?

A. Yes, sir.

384 Q. But after the injunction you were not advised with?
A. No, sir.

A. FTELEY.

Sworn to before me this 12th day of November, 1896.

B. BENJ. SCHIFF,
Notary Public, Kings Co.

Certificate filed in N. Y. Co.

Mr. RODENBECK: I offer in evidence the bid of the complainants on contract No. 1 for the construction of the masonry, water conduit and gate-house.

Mr. MARSHALL: I object to it as immaterial, incompetent and inadmissible under the pleadings, as not being involved in any of the issues in this action; that the time for the taking proofs has expired, the case having been adjourned for the purpose merely of taking the testimony of one witness, Mr. Fteley.

Marked "Exhibits A and B, Nov. 14, '96, E. C. K."

Mr. RODENBECK: I also offer in evidence the summary of the proposals received for contract No. 1 and contract No. 2 as they appear on pages 132 and 130 of the Proceedings of the Executive Board of the City of Rochester for 1892 and 1893.

Mr. MARSHALL: I make the same objection, but specially object to the summary proposals of contract No. 1 on the ground that the contract relates to entirly different work as compared to that which is involved in contract No. 2, which is the contract in controversy here.

Marked "Exhibits C and D, Nov. 14, 1896, E. C. K."

Mr. RODENBECK: I also offer in evidence notice for bids published in the papers.

385 Mr. MARSHALL: It is conceded that they are the same notices as published in the *Engineering News* and *Engineering Record*.

Same objection as previously stated

Marked "Exhibit E, Nov. 14, 1896, E. C. K."

United States Circuit Court, Northern District of New York.

THE MOFFETT, HODGKINS & CLARKE CO.
against
THE CITY OF ROCHESTER and GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester.

STATE, COUNTY, AND CITY OF NEW YORK, *ss*:

I, B. Benjamin Schiff, notary public, hereby certify that the above witness, A. Fteley, was by me first duly sworn to testify the truth, the whole truth, and nothing but the truth; that his deposition was reduced to writing by Ernest C. Kieb, stenographer, in the presence of said witness, and when completed, read over to said witness and subscribed by him in my presence and in the presence of such of

the parties and counsel as attended; that said deposition was taken pursuant to the annexed stipulation at the office of Guggenheim, Untermeyer & Marshall, Broad street, New York city, on the
386 14th day of November, 1896; that the parties were represented at the taking of such deposition by their respective counsel as set forth, and I am not of counsel or attorney or relative of either party, or otherwise interested in the event of this cause.

In witness whereof I have hereunto set my hand and official seal this 14th day of November, 1896.

B. BENJ. SCHIFF,
Notary Public in and for Kings County.

Certificate filed in New York county.

EXHIBITS A AND B.

Bid of plaintiffs on contract No. 1 (pp. 85 and 189).

EXHIBITS C AND D.

Summary of proposals received by defendants for contracts Nos. 1 and 2 (pp. 293 and 294).

EXHIBIT E. NOV. 14, '96. E. C. K.

Rochester water works.

Notice to Contractors.

OFFICE OF THE EXECUTIVE BOARD,
No. 20, CITY HALL, ROCHESTER, N. Y.

Sealed bids or proposals for the following-described pieces
387 of work will be received at the office of the executive board, No. 20, City hall, Rochester, N. Y., until 12 o'clock noon of Friday, December 23, 1892, at which hour and place the bids will be publicly opened by the chairman of said board and read:

1. The construction of a masonry water conduit from 6 to 6½ feet high and wide inside, and all appurtenances, partly in open excavation and partly in tunnel, commencing at the northeastern corner of Hemlock lake, Livingston county, N. Y., and terminating at a point on the east side of the outlet of said lake about 12,000 feet northerly.

2. The construction of a riveted steel-pipe conduit 38 or 40 inches in diameter and about 140,000 feet long, together with all appurtenances thereto, and by two different routes, beginning at the north end of the above-named masonry conduit and terminating at Mt. Hope reservoir in said city.

3. The construction of a cast-iron pipe conduit 36 inches in diameter and about 140,000 feet long together with all appurtenances thereto and by two different routes, beginning at the north end of the above-named masonry conduit and terminating at Mt. Hope

reservoir in said city; said piece of work being an alternative to the preceding item except the furnishing of the 36-inch cast-iron pipe and specials.

4. The furnishing of about 140,000 lineal feet of 36-inch cast-iron water pipe and special castings therefor, in three different thicknesses or classes, at the nearest available railroad station to the line of the proposed conduit; this piece of work being an alternative to the riveted steel pipe aforesaid.

Bidders will be required to state the shortest length of time considered necessary to complete each piece of work, and the period so stated will be duly considered by the board in making an award.

388 & 389 All bids must be made out upon the printed forms of proposal furnished by the board and the bond attached to each form of proposal must be properly executed. No proposal can be withdrawn after having once been delivered to said board or its clerk.

The proposals submitted shall include and cover the cost of furnishing all the required materials and the performance of all labor necessary for the proper completion of the proposed work in the manner set forth in the form of contract.

Special attention is herewith directed to the various provisions contained in the more detailed notices of letting and in the forms of contract, specifications and bonds, which are attached to the said printed forms of proposal.

The executive board will decide upon the quality of material and the route for the pipe conduit and will award the work in case any of said bids are accepted, as soon as practicable after the public opening and reading of said bids; but said board expressly reserves the right to reject any or all of the bids received. Blank forms of proposal, contract and specifications can be obtained, and plans for the work may be seen at the office of said board on and after December 10, 1892.

GEORGE W. ALDRIDGE, *Pres't,*
WILLIAM W. BARNARD,
JOHN U. SCHROTH,
Executive Board.

Rochester, N. Y., December 3, 1892.

390 EXH. A. Nov. 14, '96. E. C. K.

Rochester water works, 1892.

Notice of letting and forms of proposal, contract, and specifications for contract No. 1 for constructing masonry water conduit, tunnel, and gate-house for the city of Rochester, N. Y.

391 Rochester water works, 1892.

Notice to Contractors.

OFFICE OF THE EXECUTIVE BOARD,
20 CITY HALL, ROCHESTER, N. Y., —— —, 189–.

The executive board of the city of Rochester, N. Y., herewith invite proposals from contractors for the construction of a masonry water

conduit, tunnel, gate-house, overflow chambers, and the appurtenances thereto, commencing at the northeastern corner of Hemlock lake, Livingston Co., N. Y., and terminating at a point on the outlet of said lake about 12,000 feet northerly.

Sealed bids or proposals for the above work will be received at the office of said board, room 20, city hall, Rochester, N. Y., until 12 o'clock m. of —— —, 189–, at which time and place such bids will be publicly opened by the chairman of said board and read; and the award of the contract, if awarded, will be made by said board as soon thereafter as practicable.

Each bidder is required to state in his proposal, or bid, his name and place of residence; the names and residences of all persons interested with him in said proposal, and if no other person or persons be so interested, he shall distinctly state the fact; also, that said proposal is made in good faith without any collusion or connection with any other person or persons making any proposal or bid for the same work; that he has carefully examined the annexed specifications, and form of contract and bonds prepared by the said board for the work named, and that he fully understands the meaning thereof; that he has examined the general plans and locality of said work; that the prices bid by him for the several items of work are entirely independent of the quantities of such work exhibited in the accompanying statement or in the printed form of proposal, and that said quantities may be varied without limit by said board during the performance of the work without invalidating any of said prices; the shortest period of time which he deems necessary for the completion of the work in full accordance with the plans and specifications; and to give a statement of what similar work he has performed elsewhere, together with references that will enable said board to judge of his qualifications and business standing.

Each bid or proposal must be accompanied by a bond in the penal sum of $30,000, signed by at least two responsible sureties, who
392 may be either householders or freeholders of the city of Rochester, N. Y., or surety companies incorporated under the laws of said State of New York, conditioned that the person, firm or corporation making such bid, if it is accepted, will perform the work or furnish the materials, or both, mentioned in such proposal, and at such time and place as may be required by said board, will enter into the annexed contract with said city. The sureties on said proposal bond must be satisfactory to said board.

All bids must be made upon the blank forms furnished by the executive board for the purpose, and the prices for every separate item of work therein named must be plainly and distinctly written with ink, *both in words and figures*, in the proper places left therefor. These prices are to cover all expenses of every character incidental to the completion of the work in full conformity with the provisions of said contract and specifications.

The length of time specified by bidders for completing the work as aforesaid will be duly considered in making an award.

Each bid must be signed with ink, by the person or persons mak-

ing the same, with full names and addresses; and where the proposal is signed by an individual in behalf of a company or corporation, the bid must be accompanied by a properly attested power of attorney or authorization empowering said individual to sign the bid for all members of such company or corporation. Every bid shall be enclosed in a sealed envelope, indorsed "Proposal for constructing section No. 1, Rochester water-works conduit," and addressed to the executive board of the city of Rochester, N. Y., and be delivered to said board or its clerk. After having been so delivered, the bid cannot be withdrawn.

The award of the contract will be made as soon as practicable after the bids have been publicly opened and read. Within five days after the service of a written notice to the successful bidder that such award has been made, said bidder, or the persons making such bid, will be required to attend at the office of the executive board, along with the sureties offered by him or them, and execute in triplicate, the aforesaid contract for the performance of the work in full accordance with the terms thereof; and in case of failure or neglect so to do, he or they will be considered as having abandoned all intention of executing such contract or performing said work.

When the contract is executed, two bonds must be furnished by the contractor, each in the penal sum of $75,000, conditioned respectively for the proper performance of the contract, and for the payment of all workmen's wages; the forms of said bonds are attached to the annexed contract. The sureties on the bond for the
393 performance of the contract may be two or more responsible householders or freeholders of the State of New York, or surety companies incorporated under the laws of said State; and the sureties on the bond for the payment of all workmen's wages must be three or more responsible freeholders of said State, none of whom shall justify in an amount less than $5,000. The adequacy and acceptability of the sureties on both of said bonds will be determined by said board, and the names of the sureties must be submitted along with said bid or proposal.

The work is to be commenced within ten days after the execution of the contract, and shall be prosecuted with all possible regularity and energy until its completion.

The following is a statement, based upon the estimate of the engineer, of the approximate quantities of the various classes of work and of the nature and extent, as near as now practicable, of the work required; and the bids will be tested, compared and canvassed by the quantities and qualities therein set forth.

Statement of Items and Quantities of Work.

a. All pumping, bailing and draining in the entire work.
b. Six (6) acres grubbing and clearing.
c. Fifteen hundred (1,500) cubic yards of earth excavation in roadway grading and constructing permanent new channels for water-courses carried over the conduit.

d. Two hundred (200) cubic yards of rock excavation in roadway grading and constructing permanent new channels for water-courses carried over the conduit.

e. Twenty-five thousand (25,000) cubic yards of earth excavation in open trenches or pits for the conduit, gate-house, overflows and culverts.

f. Four thousand (4,000) cubic yards of rock excavation in open trenches or pits for the conduit, gate-house, overflows and culverts.

g. Two hundred (200) cubic yards of earth excavation in shafts for tunnel-work.

h. Six hundred (600) cubic yards of rock excavation in shafts for tunnel-work.

i. Fifteen hundred (1,500) cubic yards of earth excavation in tunnel for conduit.

j. Fifteen thousand five hundred (15,500) cubic yards of rock excavation in tunnel for conduit.

k. Five thousand (5,000) cubic yards of excavated material, of any kind and from any source, to be hauled over 1,000 feet distance.

394 *l.* Forty-three hundred (4,300) cubic yards concrete masonry with natural cement for foundations, backing and walls of the conduit, gate-house, overflow chambers, culverts and other structures built in open excavations.

m. Twenty-five hundred (2,500) cubic yards concrete masonry with natural cement for foundations and backing of lining masonry built in the tunnel and shafts.

n. Eight hundred (800) cubic yards brick masonry in Portland cement in gate-house and overflow chambers.

o. Twenty-nine hundred (2,900) cubic yards brick masonry in Portland cement in the conduit, manholes, culverts and minor structures built in open excavations.

p. Thirty-nine hundred (3,900) cubic yards brick masonry in Portland cement in lining of the tunnel and shafts.

q. One hundred (100) cubic yards rubble masonry in Portland cement in gate-house and overflow chambers. (See note below.)

r. One hundred (100) cubic yards rubble masonry in Portland cement in the conduit, manholes, culverts and minor structures built in open excavations. (See note below.)

s. One hundred (100) cubic yards rubble masonry in Portland cement in the lining of the tunnel and shafts. (See note below.)

t. One hundred (100) cubic yards rubble masonry in natural cement for foundations, backing and walls of conduit, gate-house, overflow chambers, culverts and other structures built in open excavations. (See note below.)

u. Fifteen (15) cubic yards cut-stone copings, etc., set in Portland cement in gate-house, overflow chambers and other structures.

v. One hundred (100) cubic yards screened gravel for foundations of conduit, gate-house, overflow chambers, culverts and other structures built in open excavations.

w. One hundred (100) cubic yards broken stone for foundation of conduit, gate-house, overflow chambers, culverts and other structures built in open excavations.

x. One hundred (100) cubic yards slope-wall for protecting banks and channels.

y. One hundred (100) cubic yards stone paving for protecting banks and channels.

z. One hundred (100) cubic yards riprap for protecting banks and channels.

aa. One hundred (100) cubic yards brush and stone for protecting banks and channels.

395 *bb.* Fifty (50) lineal feet furnishing and laying 24-inch cast-iron water pipe, complete, for culverts.

cc. Fifty (50) lineal feet furnishing and laying 20-inch cast-iron water pipe, complete, for culverts.

dd. Fifty (50) lineal feet furnishing and laying 16-inch cast-iron water pipe, complete, for culverts.

ee. Fifty (50) lineal feet furnishing and laying 12-inch cast-iron water pipe, complete, for culverts.

ff. Fifty (50) lineal feet furnishing and laying 20-inch vitrified earthenware pipe, complete, for culverts.

gg. Fifty (50) lineal feet furnishing and laying 18-inch vitrified earthenware pipe, complete, for culverts.

hh. Fifty (50) lineal feet furnishing and laying 15-inch vitrified earthenware pipe, complete, for culverts.

ii. Fifty (50) lineal feet furnishing and laying 12-inch vitrified earthenware pipe, complete, for culverts.

jj. Fifty (50) lineal feet furnishing and driving through earth, 8-inch iron vertical ventilating pipe for tunnel.

kk. Fifty (50) lineal feet, furnishing and driving through earth, 7-inch iron vertical ventilating pipe for tunnel.

ll. Fifty (50) lineal feet, furnishing and driving through earth, 6-inch iron vertical ventilating pipe for tunnel.

mm. Two hundred (200) lineal feet drilling 8-inch vertical ventilating hole in rock for tunnel.

nn. Two hundred (200) lineal feet drilling 7-inch vertical ventilating hole in rock for tunnel.

oo. Two hundred (200) lineal feet drilling 6-inch vertical ventilating hole in rock for tunnel.

pp. Thirty-two hundred (3,200) lineal feet timber piles in foundations for conduit, gate-house, overflow chambers, culverts and other structures built in open excavations.

qq. Forty thousand (40,000) feet B. M., timber and plank put permanently in place in foundations of conduit, gate-house, overflow chambers, culverts and other structures built in open excavations.

rr. Twenty-four thousand (24,000) pounds wrought-iron beams, guides, bolts, rods, steps, spikes, etc., in gate-house, overflow

chambers, conduit, manholes, shafts, and in foundations for same.

ss. Twenty thousand (20,000) pounds cast-iron beams, braces, guides, sluiceways, weirs, manhole curbs and covers, washers, etc., in gate-house, overflow chambers, tunnel shafts, manholes and other structures.

(NOTE.—The items *q*, *r* and *s* in the above statement have
396 been introduced with nominal quantities, with the understanding that said quantities of rubble masonry may be increased at the option of the executive board, to any extent not exceeding those for brick masonry given in the aforesaid items *n*, *o* and *p*, respectively, for the purpose of comparing bids, and that the quantities of brick masonry in said items *n*, *o* and *p* may be correspondingly reduced. The same explanation also applies to the case of the rubble masonry in item *t*, relatively to the concrete masonry in item *l*.)

The foregoing quantities shall be regarded only as approximations to those which may actually be required in the performance of the work, and the executive board, therefore, expressly reserves the right to make any variations whatever in said quantities, at any time before the commencement or during the progress of the work, as may be deemed expedient by said board, without thereby invalidating any of the prices named in the accepted proposal. Every bidder must form, and be governed by, his own estimate of the probable quantities of each class of excavation, masonry and other items of work set forth in the foregoing statement of quantities, and of the probable quantities of all the items enumerated in the printed form of proposal furnished by said board; and he shall not, at any time after the submission of any estimate made by the engineer for work performed, dispute or complain of the foregoing statement of quantities, or assert that there was any misunderstanding in regard to the nature or amount of the work to be done, if the actual quantities required of any item prove to be more or less in any degree whatever than the aforesaid quantities, or even if some of the said items should be excluded entirely.

Special attention of contractors is called to the specifications and form of contract under which the work is to be done, also to the foregoing requirements as to form of proposal and character and amount of bonds required.

General plans for the work can be seen and specifications and forms of proposal and contract and bonds can be obtained at the office of the executive board, 20 city hall, Rochester, N. Y.

The executive board expressly reserves the right to reject any or all proposals, and to award the work as it may deem for the best interests of the city.

GEORGE W. ALDRIDGE, *President*,
WILLIAM W. BARNARD,
JOHN U. SCHROTH,
Executive Board.

ROCHESTER WATER WORKS.

397

PROPOSAL

FOR

Constructing a Masonry Water Conduit, Tunnel, Gate House, Overflow Chambers, and the Appurtenances thereto, commencing at the north-eastern corner of Hemlock Lake, Livingston County, N. Y., and terminating at a point on the outlet of said lake about 12,000 feet northerly.

To the Executive Board of the City of Rochester, N. Y.:

The undersigned hereby declare...that..he.....the only person.. interested in this proposal; that the same is made in good faith, without any collusion or connection with any other person or persons making any other proposal for the work named; that...he....ha....carefully examined the annexed notice of letting, specifications and form of contract and bonds, also the general plans and locality of the work therein referred to; that...he...fully understand...the meaning of said notice, specifications, contract and bonds, and will fully comply with all the terms therein set forth; that...he...will provide all necessary machinery, tools, apparatus and other means for construction, and furnish all required materials and perform all labor of every description called for by said notice, specifications and contract in the manner and under the terms and conditions therein prescribed; and that...he... will faithfully construct and complete the proposed work for the consideration of and at the following sums or prices, viz.:

a. For all **Pumping, Bailing and Draining** in open excavations and in the shafts and tunnel, for the entire work, including furnishing and maintaining all necessary appliances and labor, the gross sum of Twenty Thousand Dollars dollars ($ 20,000)

b. For all **Grubbing and Clearing,** including all incidental work, the sum of Seventy five Dollars ($ 75) per acre of surface actually cleared.

c. For all **Earth Excavation in Roadway Grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **Permanent New Channels for Water-Courses** carried over the conduit, including haul of 1,900

feet or less, making embankments and other final disposal of the excavated material, and all incidental work, the sum of
398 Thirty cents ($ .30) per cubic yard.

d. For all **Rock Excavation in Roadway Grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **Permanent New Channels for Water-Courses** carried **over** the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, and all incidental work, the sum of
One Dollar & fifty cents ($ 1.50) per cubic yard.

e. For all **Earth Excavation in Open Trenches or Pits,** for the conduit, gate-house, overflow-chambers and culverts carried under the conduit, including bracing and sheeting, backfilling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of
Seventy five cents ($ .75) per cubic yard.

f. For all **Rock Excavation in Open Trenches or Pits,** for the conduit, gate-house, overflow-chambers and culverts carried under the conduit, including bracing and shoring, backfilling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of
One dollar & fifty cents ($ 1.50) per cubic yard.

g. For all **Earth Excavation in Shafts** for tunnel, including all necessary bracing, timbering, backfilling and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of
Seventy five cents ($ .75) per cubic yard.

h. For all **Rock Excavation in Shafts** for tunnel, including all necessary bracing, timbering, back-filling and other final disposal of the ~~excavated~~ material with haul of 1,000 feet or less, and all incidental work, the sum of
Six Dollars ($ 6.) per cubic yard.

i. For all **Earth Excavation in Tunnel,** including all necessary bracing timbering, lighting, ventilating, removal and backfilling and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of one dollar.
($ 1.00) per cubic yard.

k. For all **Rock Excavation in Tunnel,** including all necessary bracing, timbering, lighting, ventilating, removal and backfilling and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of Twelve Dollars ($ 12.—) per cubic yard.

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l. For **Hauling more than 1,000 Feet** any excavated material from sides of open excavations, or from ends of tunnel or tops of shafts, including making and grading of embankments and spoil banks, and all incidental work, the sum of one cent ($ .01) per cubic yard, measured in excavation, for each additional one hundred feet hauled, or fraction thereof greater than fifty feet.

l. For all **Concrete Masonry** mixed in the proportion of one part **Natural Cement,** two parts sand and five parts ballast, deposited and rammed in place in foundations, backing and walls of the gate-house, overflow-chambers, culverts and other structures, and in the foundation, sides and top of the conduit, built **in open excavation,** including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of Six Dollars ($ 6.—) per cubic yard.

m. For all **Concrete Masonry** mixed in the proportion of one part **Portland Cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations, backing and walls of the gate-house, overflow chambers, culverts and other structures, and in the foundations, sides and top of the conduit, built **in open excavation,** including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of Eight Dollars ($ 8.—) per cubic yard

n. For all **Concrete Masonry** mixed in the proportion of one part **Natural Cement,** two parts sand, and five parts ballast, deposited and rammed in place in foundations and backing of lining masonry built **in the Tunnel and Shafts,** including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of Seven Dollars ($ 7.—) per cubic yard.

o. For all **Concrete Masonry** mixed in the proportion of one part **Portland Cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations and backing of lining masonry built **in the**

Tunnel and Shafts, including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of

400 Nine Dollars ($ 9—) per cubic yard.

p. For all **Brick Masonry laid with Natural Cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in Foundation Walls of Gate-house and Overflow-chambers**, including furnishing, placing and removing staging, centering, moulds and forms setting all required iron work, cleaning, pointing, applying cement wash, and all incidental work, the sum of

~~Twenty~~ Sixteen Dollars ($ 16—) per cubic yard.

q. For all **Brick Masonry laid with Portland Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in Foundation Walls of Gate-house and Overflow-chambers**, including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, cleaning, pointing, applying cement wash, and all incidental work, the sum of Eighteen Dollars —

($ 18—) per cubic yard.

r. For all **Brick Masonry laid with Natural Cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in the Conduit, Man-holes, Culverts and Minor Structures**, built in open excavation, including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of Eighteen Dollars ($ 18—) per cubic yard.

s. For all **Brick Masonry laid with Portland Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the Conduit, Man-holes, Culverts and Minor Structures**, built in open excavation, including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of Twenty Dollars ($ 20—) per cubic yard.

t. For all **Brick Masonry laid with Natural Cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in the Tunnel and Shafts**, including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of Twenty five Dollars ($ 25—) per cubic yard.

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t. For all **Brick Masonry laid with Portland Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the Tunnel and Shafts**, including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of Twenty-seven ($ 27 —) per cubic yard.

v. For all **Rubble Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in Foundation, Backing and Walls of the Gate-house and Overflow-Chambers**, built in open excavation, including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, and all incidental work, the sum of ~~Eighteen Dollars ($ 18~~ Twelve Dollars 12,) per cubic yard.

w. For all **Rubble Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, **in Foundation, Backing and Walls of the Gate-house and Overflow-chambers**, built in open excavation, including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, and all incidental work, the sum of ~~Twenty Dollars ($ 20~~ Fourteen Dollars 14) per cubic yard.

x. For all **Rubble Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the Conduit, Manholes, Culverts and Minor Structures**, built in open excavations, including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, and all incidental work, the sum of Fifteen Dollars ($ 15 —) per cubic yard.

y. For all **Rubble Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, **in the Conduit, Manholes, Culverts and Minor Structures**, built in open excavations, including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, and all incidental work, the sum of Seventeen Dollars ($ 17) per cubic yard.

z. For all **Rubble Masonry laid with Natural Cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the Tunnel and Shafts**, including furnishing, placing and removing centering,

moulds and forms, setting all required iron work, plastering, cleaning, pointing, and all incidental work, the sum of Eighteen Dollars ($ 18 —) per cubic yard. 402

aa. For all **Rubble Masonry laid with Portland Cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, **in the Tunnel and Shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron work, plastering, cleaning, pointing, and all incidental work, the sum of Twenty Dollars ($ 20 —) per cubic yard.

bb. For all **Cut Stone Masonry and Copings** laid in Portland cement mortar, mixed in the proportion of two and one-half parts sand to one part cement, in gate-house, overflow-chambers, shafts and other structures, including cleaning, pointing, and all incidental work, the sum of Fifty Dollars ($ 50 —) per cubic yard.

cc. For all **Screened Gravel** deposited in foundations of conduit, gate-house, overflow-chambers, culverts and other structures, built in open excavations, including ramming in place, and all incidental work, the sum of Two Dollars ($ 2 —) per cubic yard.

dd. For all **Broken Stone** deposited in foundations of conduit, gate-house, overflow-chambers, culverts and other structures, built in open excavations, including ramming in place, and all incidental work, the sum of One Dollar & fifty cents ($ 1.50) per cubic yard.

ee. For all **Slope Wall** laid dry for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of Three Dollars & fifty cents ($ 3.50) per cubic yard.

ff. For all **Stone Paving** laid for protecting the sides of earthen embankments and excavations, the channels of water-courses, and the bottoms of culverts, including all incidental work, the sum of Five Dollars ($ 5 —) per cubic yard.

gg. For all **Rip-Rap** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of Two Dollars ($ 2 —) per cubic yard.

hh. For all **Brush and Stone** put in place for protecting the sides of earthen embankments, excavations and channels of water courses, including all incidental work, the sum of One Dollar & fifty cents ($ 1.50) per cubic yard.

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ii. For all **24-inch Cast-iron Water Pipe** for culverts, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of ~~Three Dollars &~~ Four Dollars ($ 4—) per lineal foot.

jj. For all **20-inch Cast-iron Water Pipe** for culverts, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of Three Dollars ($ 3,) per lineal foot.

kk. For all **16-inch Cast-iron Water Pipe** for culverts, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of Two Dollars & twenty five cents ($ 2.25) per lineal foot.

ll. For all **12-inch Cast-iron Water-Pipe** for culverts, furnished and laid with hot lead joints, complete in every respect, including all incidental work, the sum of One Dollar & fifty ($ 1.50) per lineal foot.

mm. For all **20-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect including all incidental work, the sum of One Dollar & twenty five cents ($ 1.25—) per lineal foot.

nn. For all **18-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of One Dollar ($ 1.—) per lineal foot.

oo. For all **15-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of Eighty cents ($ .80) per lineal foot.

pp. For all **12-inch Vitrified Earthenware Pipe** for culverts, furnished and laid with Portland Cement joints, complete in every respect, including all incidental work, the sum of Seventy cents ($ .70) per lineal foot.

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qq. For all **8-inch Heavy Wrought-iron Well Tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of ~~One Dol~~ Two Dollars ($ 2.) per lineal foot.

rr For all **7-inch Heavy Wrought-iron Well Tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of One Dollar & sixty cents ($ 1.60) per lineal foot.

ss. For all **6-inch Heavy Wrought-iron Well Tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of One Dollar & thirty cents ($ 1.30) per lineal foot.

tt. For all **Tunnel Ventilation Holes 8 inches in Diameter,** drilled through ledge rock from the bottom of the eight-inch tubing to the top of the tunnel, including all incidental work, the sum of Eight Dollars ($ 8.00) per lineal foot.

uu. For all **Tunnel Ventilation Holes 7 inches in Diameter,** drilled through ledge rock, from the bottom of the seven-inch tubing to the top of the tunnel, including all incidental work, the sum of Two Dollars & eighty cents ($ 2.80) per lineal foot.

vv. For all **Tunnel Ventilation Holes 6 inches in Diameter** drilled through ledge rock, from the bottom of the six-inch tubing to the top of the tunnel, including all incidental work, the sum of Two Dollars & seventy five ($ 2.75) per lineal foot.

www. For all **Timber Piles** furnished, driven and left in place in foundations of conduit, gate-house, overflow-chambers and other structures built in open excavations, including all incidental work, the sum of Thirty five cents ($ 0.35) per lineal foot.

xx. For all **Timber and Plank** furnished and put in place in foundations of conduit, gate-house, overflow-chambers, culverts and other structures built in open excavations, including all incidental work, the sum of
405 Thirty fir Dollars ($ 35.—) per thousand feet, B. M.

yy. For all **Wrought-iron Work,** such as bolts, beams, channels, guides, steps, spikes, nails, etc., furnished and set in place wherever required in any masonry or foundation, including coating and all incidental work, the sum of three & one Half cents ($ .03½) per pound.

zz. For all **Cast-iron Work,** such as beams, braces, channels, guides, washers, sluice-ways, weirs, man-hole curbs and covers, etc., furnished and set in place wherever required in any masonry or foundation, including coating and all incidental work, the sum of
three & one Half cents ($ .03½) per pound.

TIME FOR COMPLETION OF WORK.

daa. **Least Number of Consecutive Days** after execution of Contract required to complete the whole work .....
..... (.....)

It is distinctly understood that the quantities referring to the various items of work exhibited in the statement contained in the annexed notice of letting, are only approximations to those which may actually be required in the performance of the work, and that the same have been submitted merely as a basis for the comparison of this proposal with others; also, that the right is expressly reserved to the Executive Board to make any variations whatever in said quantities, at any time before the commencement or during the progress of the work, as may be deemed necessary or expedient by said Board, without thereby invalidating any of the prices above named.

The undersigned will commence the work within ten days after the execution of the contract, and will progress therewith to its completion within the period above named, in accordance with all the terms of said contract.

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Accompanying this proposal is a bond in the penal sum of thirty thousand dollars ($30,000), conditioned that if this proposal shall be accepted by said Board, the undersigned will perform the work or furnish the materials, or both, mentioned in this proposal, and will, at such time and place as may be required by said Board, well and truly enter into the annexed contract with said City.

Signature of person, firm or corporation making this bid .....

.....

.....

Post Office Address, ...

Dated .....

Following are the full names and residences of all persons who are interested as principals in this bid :—

NOTE.—The names of bidders may be published; but the names of all parties interested with them are submitted for the information and guidance of the Executive Board alone, and are *not* to be made public. If any corporation is so interested, its name along with the names of the president, treasurer and manager thereof, is herewith submitted.

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407 Following are the full names and residences of the sureties who will sign the required bonds of the contract if this bid is accepted:—

Sureties on bond for performance of contract.

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Sureties on bond for payment of workmen's wages.

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Following is a list of similar public works executed by the bidder, and of persons to whom the executive board is referred for information as to the qualifications and business standing of the bidder:—

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PROPOSAL BOND.

Know all Men by These Presents That

principal , and

sureties, parties of the first part, are held and firmly bound unto the City of Rochester, New York, party of the second part, in the sum of thirty thousand dollars, ($30,000.00), lawful money of the United States of America, to be paid to the said city of Rochester, its successors or assigns, for which payment, well and truly to be made, we bind ourselves, our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed this day of
in the year of our Lord one thousand eight hundred and ninety-

Whereas, The executive board of the city of Rochester, N. Y., has advertised for sealed proposals for the construction of a masonry water conduit, tunnel, gate-house, overflow chambers, and the appurtenances thereto, commencing at the northeastern corner of Hemlock lake, Livingston county, N. Y., and terminating at a point on the outlet of said lake about 12,000 feet northerly; and said

principal , ha made a proposal to said city of Rochester, bearing date the day of 189 , for the construction of the aforesaid work, which proposal is hereto annexed:

409 **Now, Therefore,** The condition of this obligation is such, that, if the proposal of said

is accepted by said board, and if said

shall perform the work, or furnish the materials, or both, mentioned in such proposal, and shall at such time and place as may be required by said board, well and truly enter into the contract with said city, hereto attached, and give the bonds and undertakings and sureties therein required, without fraud or delay, then this obligation shall be void, otherwise to be and remain in full force and effect; and

Whereas, The damages that may be sustained by said party of the second part from any default or failure on the part of said

principal

as aforesaid, are certain and the proof thereof by legal evidence is difficult, if not impossible:

Now, Therefore, It is covenanted and agreed by and between the parties hereto, and each of them, and made an express condition of this obligation, that for a failure and default on the part of said

principal

to enter into said written contract and give said bonds, undertakings and sureties, or to do either, the damages payable and recoverable upon this bond shall not be the penalty therefor, but shall be the sum of thirty thousand dollars ($30,000.00), and interest thereon from the date of such default. The said sum is hereby agreed upon and fixed as reasonable under the circumstances, and that which shall be paid by the obligators above named as liquidated damages hereon.

410 **In Witness Whereof,**

this day of 189

Signature of principal and sureties.

411 (*Acknowledgment for Individuals.*)

STATE OF NEW YORK,
County of ——, *City of* ——, } *ss:*

On this day of 189 , before me, the subscriber, personally appeared

to me known to be the same persons described in and who executed the foregoing instrument, and they severally duly acknowledged that they executed the same.

412 (*Acknowledgment for a Corporation.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } *ss.:*

On this day of 189 , before me the subscriber, personally appeared to me personally known, who, being by me duly sworn, did depose and say: I am the president of the

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

(*Acknowledgment for a Corporation.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } *ss.:*

On this day of 189 , before me the subscriber, personally appeared to me personally known, who, being by me duly sworn, did depose and say: I am the president of the

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

413 (*Justification for Personal Sureties.*)

STATE OF NEW YORK,
County of ——, *City of* ——, } *ss:*

sureties within named, being duly sworn, depose and say, and each for himself says, that he resides in the city of Rochester, N. Y., and said

over and above all debts and liabilities which he owes, or has incurred, and exclusive of property exempt by law from levy and sale under an execution.

Signature of sureties.

Subscribed and sworn to before me this day of 189 .

414 (*Justification for a Surety Company.*)

STATE OF NEW YORK, }
County of ——, *City of* ——, } *ss.:*

being duly sworn, deposes and says: I am the president of

a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm, or corporation desiring the same; said

is worth the sum of
dollars, over and above all the debts now existing against said

either by way of bond, mortgage, or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of 189 .

415 (*Justification for a Surety Company.*)

STATE OF NEW YORK,
County of ——, *City of* ——, } ss.:

being duly sworn, deposes and says: I am the president of

a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm, or corporation desiring the same; said

is worth the sum of
dollars, over and above all the debts now existing against said

either by way of bond, mortgage, or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of
189 .

Form of agreement, to be executed in triplicate, two of which are to be kept by the executive board of the city of Rochester, N. Y., and one to be delivered to the contractor.

CONTRACT AND SPECIFICATIONS

FOR THE

Construction of a masonry water conduit, tunnel, gate-house, overflow chambers, and the appurtenances thereto, commencing at the northeastern corner of Hemlock lake, Livingston Co., N. Y., and terminating at a point on the outlet of said lake about 12,000 feet northerly.

This agreement made and entered into this ..... day of ..... in the year one thousand eight hundred and ninety-.... by and between the City of Rochester, N. Y., acting by and through the executive board of said city by virtue of the power vested in said executive board by the charter of said city, party of the first part, and

....

.....

... .

as contractor and party of the second part:

Witnesseth, That the said parties hereto, each in consideration of the covenants and agreements on the part of the other herein contained, have covenanted and agreed, and by these presents do covenant and agree to and with each other, and for themselves, their heirs, executors, administrators, successors, and assigns, and the party of the second part also covenants and agrees under the conditions expressed in the bonds bearing even date with these presents and hereunto annexed, as follows:

1. **Definitions.**—The word "board," or a pronoun in place of it, when used in this contract, is understood to mean the executive board of the city of Rochester, N. Y., and their successors or

assigns; the word "engineer," or a pronoun in place of it, the chief engineer of said board,
417 or his successor in office, acting either directly, or through his properly authorized agents, such agents acting within the scope of the particular duties intrusted to them; the words "chief engineer," to the chief engineer of said board, or his successor in office, and him only; the word "contractor," or a pronoun in place of it, the person or persons, copartnership or copartnerships, corporation or corporations, that have entered into this contract as the party of the second part, and his, its or their heirs, executors, administrators, successors or assigns; the word "city," the city of Rochester, New York, party of the first part, its successors or assigns.

2. **Work.**—The contractor hereby covenants and agrees that he will, at his own cost and expense, furnish and provide all the materials, tools, implements, machinery, apparatus, and other appliances, and perform all the work, labor, and services, required to construct, build, and put in complete working order, a MASONRY WATER CONDUIT, WITH GATE-HOUSE, OVERFLOW CHAMBERS, TUNNEL, SHAFTS, MANHOLES, CULVERTS, AND OTHER APPURTENANCES THERETO, commencing at or near the northeastern corner of Hemlock lake, Livingston Co., N. Y., and terminating at a point on the east side of the outlet of said lake, about 12,000 feet northerly, in a good, substantial and workmanlike manner to the satisfaction of said board and said chief engineer, in strict conformity in every part and particular to the following specifications, which are hereby made a part of this contract, and also in strict conformity with such plans, drawings, and explanatory or subordinate directions as said engineer shall furnish from time to time for the proper fulfillment of this contract:

SPECIFICATIONS.

General description of work.

3. **General description.**—The work to be done under this specification embracess the construction of a water conduit, from 6 to 6½ feet high and wide inside, of circular or horseshoe-shaped section, built both in tunnel and open excavation in earth and rock, together with the required gate-house and overflow substructures, and all necessary culverts, manholes, shafts and ventilation tubes for said conduit, the work to begin at the shore of Hemlock lake, near the northeastern

corner thereof, and to terminate at a point at or near the outlet of said lake about 12,000 ft. northerly.

Items of work to be done.

4. The contractor is to perform all of the necessary grubbing and clearing of the surface, within the limits of the right of way acquired by the city, for the construction of the working shafts and the conduit in open trench; to properly clear the areas designated for the deposit of all excavated material not elsewhere needed for backfilling over the conduit; to make the required excavations in earth, rock or other material, for the conduit, shafts, gate-house, overflow chambers, culverts and other appurtenances, in accordance with the plans and directions of the engineer, or for the convenient and faithful execution of the work in accordance with such plans; to do all necessary ditching, pumping, bailing and draining, sheeting and shoring of the sides of such excavations; to make all required embankments under and over said conduit; to construct suitable channels for carrying natural water-courses over or under said conduit, both temporarily and permanently; to make all provisions necessary for maintaining the safety of the public, as well as the travel on public and private roads, and to protect from injury all buildings, fences, culverts, drain-tile, drainage ditches, water pipes, natural water-courses, and the existing water-works conduit with its appurtenances, and to promptly repair all damage done to such objects, structures and appurtenances; to construct all required foundations and put in place all necessary stone-work, brick-work, metal-work and timber-work; to refill all trenches, shafts and excavations for said conduit in accordance with the plans and directions of the engineer; to clear away and remove all rubbish and surplus material of every description; to furnish all materials except such as the executive board may elect to provide, as hereinafter mentioned, and all tools, implements, appliances and labor of every description, required to build and put in complete working order the said conduit.

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Right to change location of conduit and quantities exhibited.

5. The executive board reserves the right to change the location of the conduit and its appurtenances, at any time before the commencement, or during the progress of the work, and to any extent which it may deem expedient, from the lines and routes indicated upon the plans at the time of letting the work, also to modify or

wholly change the relative quantities of the different items of work contemplated to be performed at said time; and the contractor shall not have or make any claim for extra compensation in consequence of any such changes of location, route or quantities.

Substitution of tunnel-work for open-trench work, and conversely.

6. The places where it is now believed that the excavation for the conduit is to be made in tunnel and in open trench, respectively, with the limits of each, are shown upon the maps or plans; but if, in the opinion of the engineer, the nature of the material to be excavated at any point, or other conditions of the case shall render it advisable, said engineer may require any part of the excavation shown on said plans to be in tunnel, to be made in open trench; and conversely, he may require any part of the excavation shown on said plans to be in open trench, to be made in tunnel. No allowance for any such change of method of excavation will be made beyond the regular prices bid for the diffferent classes of excavation.

Diagrams showing limits of excavation and masonry to be paid for.

419 7. The appended diagrams marked No. 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14, entitled "Diagrams exhibiting limits of excavation and masonry in open-trench and tunnel work that will be estimated for payment" and signed by E. Kuichling, chief engineer, Nov. 1, 1892, determine the lines according to which estimates of the excavation and masonry required in the construction of the conduit, will be made.

Distinction between lining masonry and backing or filling masonry.

8. Attention is called to the fact that in the said diagrams, and also in the following specifications, a distinction has been made between the brick or rubble masonry which forms the interior shell or "lining" of the conduit, and the concrete or rubble masonry which forms the "backing" or the "filling" of the conduit, in open-trench and tunnel excavation, respectively; this distinction being rendered necessary only for the purpose of defining the limits of excavation for which payment will be made. In further explanation of said diagrams, it is to be understood that the "lining masonry" thereupon indicated, for the conduit in open trench and in tunnel, shall in each case be uniform in thickness, which thickness shall be not less than eight (8) inches for the roof and sides, and not less than four (4) inches for the bottom or invert, where lining may be required for the latter.

Construction plans exhibited may be altered.

9. The construction plans in the office of the chief engineer, exhibited at the time of the letting and numbered I, II, III, IV, V, VI, VII, and VIII, show in a general manner the types of some of the various structures to be built under these specifications. Their exact forms cannot be determined in advance, as they may be modified in view of the prices bid, and of the quality and location of materials found as the work progresses; therefore, said plans shall be regarded as approximate both in dimensions, character of material and relative position. As the work advances definite plans and directions will be furnished by the engineer and the work shall be done in accordance therewith.

Water gates, fittings and pipe furnished by board.

10. **Materials to be provided by the executive board.**—The executive board will provide and deliver, at the nearest available railroad station to the conduit, all water gates, and special castings and fittings appertaining thereto; also a section of steel, wrought-iron or cast-iron pipe, about five feet in diameter and fifteen feet, more or less, in length. The contractor shall transport said material from the point of delivery by said board, and shall store the same in the vicinity of the works, and be responsible for loss incurred or damage done to said materials from the time of their delivery until the work is completed and finally accepted. For such transportation, storage, and responsibility, payment will be made at the rate of two (2) dollars per net ton (2,000 lbs.) of said gates, castings and pipe. Any other expense to the contractor involved in said work must be included in the prices bid per cubic yard for masonry. All reasonable effort will be made to have the said materials delivered in ample season, but delay on the part of the said board in furnishing the same shall not give cause to the contractor for claims for damages. Should such delay occur, the time for completing the work shall be extended as the engineer may deem necessary.

Payment for transporting and storing said materials.

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Width in different localities.

11. **Right of way.**—The right of way in, over, and through private lands for the construction of the conduit and its appurtenances is in general 66 feet wide in shallow cuttings, 99 feet wide in deep cuttings, and 33 feet wide in tunnel. The contractor shall not enter or occupy with men, tools or materials, any land outside of the limits of the right of way obtained by the executive board, without having first acquired, at his own

expense, the right to do so from the proper parties; and he will also be required to observe strictly all conditions and restrictions that may be incorporated in any easement affecting this work, and will be held responsible for any damage done by him or his employees to any adjoining property or premises. At the gate-house and other structures where, in the opinion of the engineer, more space may be required for purposes of construction, larger areas of right of way than above defined will be provided by the executive board.

Responsibility for damages.

12. **Fences.**—Wherever it may be deemed expedient or necessary for the protection of life or property, the contractor shall erect and maintain suitable fences, at his own expense, along roadways and around the grounds occupied by him, such fences to conform to the directions of the engineer and to the requirements of the easements as aforesaid, and to be removed after the completion of the work in the locality in question.

Fences to be maintained.

13. **Bridges, crossings and barriers.**—Wherever it is necessary to interfere with public or private roads, the contractor shall, at his own expense, provide and maintain suitable and safe bridges or other sufficient crossings for the accommodation of the travel on said roads, and shall remove such bridges and other temporary crossing expedients as soon as practicable, and shall restore said roads to as good a condition as before commencing the work. The contractor shall give ample notice to the owners of private roads before interfering with them; and he shall also provide at his own expense watchmen and suitable barriers, fences, and signals, both by day and by night, wherever such may be needed, and take such other precautions as may be necessary for the protection of life and property.

Temporary bridges or crossings.

Notice to owners of private roads.

Watchmen, barriers, and signals.

14. **Roadways.**—In all places where it is not designed to permanently alter the present conformation of the surface, the contractor will be required to construct and maintain at his own expense suitable roadways upon the acquired right of way and places of deposit for surplus excavation, for the transportation of material, and where use is made of any private roadway or lane for this purpose, the consent of the owners thereof must first be secured by him. Furthermore, in all cases where he may deem it expedient in the performance of his work to construct a roadway in private lands

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Roadways made at contractor's expense.

Use of private roadways and lands.

through which the executive board has not acquired an easement, the necessary right of way shall be obtained and the roadway built at his expense. The contractor shall also assume full responsibility for the safety and sufficiency of all bridges and culverts on any public or private roadway which may be used by him in the transportation of materials to and from the works.

Responsibility for bridges and culverts.

Stakes, etc.

15. **Line and grade marks.**—The contractor shall furnish, at his own expense all labor, tools, appliances, stakes, forms, spikes, timbers, and materials, other than engineering assistance and instruments, that may be required to enable the engineer to give the necessary lines, grades, and levels for the proper construction of the work. All such marks shall be carefully preserved, and if they are removed through the negligence of the contractor without the consent of the engineer, the expense of replacing them will be charged to him and deducted from the amount due on his final settlement.

Line and grade marks to be preserved.

Assistance required in making measurements, etc.

16. **Measurements and inspection.**—The contractor shall also furnish, at all reasonable times and without charge, all labor, tools, appliances, and materials of every kind, except engineering assistance and instruments, necessary to enable the engineer to make any inspection, test, or measurement of the work performed; and he shall also convey without charge said engineer and his assistants, or any other employees of the executive board, safely up and down any shaft at all reasonable times, and without claim for any necessary delay of the work while such lines, grades or levels are being given, or such inspections, tests and measurements are being made.

Access to work.

Clearing surface of trees, etc.

17. **Grubbing and clearing.**—All trees, stumps, brush, logs, walls, boulders and other obstructions shall be cleared from the line of the conduit, where it is built in open trench, and also from the site of any shaft, gate-house or other structure. The width of the clearing will be determined by the engineer in each case, but it shall not extend beyond the limits of any territory controlled by the executive board, except as the privilege of doing so shall first be obtained by the contractor, and at his expense, from the proper parties. The places of deposit for the excavated material shall also be properly cleared to the extent required by the engineer.

Property of city.

18. Fences, buildings and merchantable timber, stone and wood on the right of way, shall be regarded as the property of the city, and all such material shall be properly removed, piled and stored by the contractor without extra charge.

Replacing fences.

All fences must be replaced at the contractor's cost in a manner satisfactory to the engineer, after the completion of the conduit. On previously cleared land, no payment for such removals and replacements will be made, as the amount of this work is believed to be comparatively insignificant.

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Payment.

19. The grubbing and clearing will be paid for at the price bid per acre by the contractor in his proposal, but only the surface actually cleared of growing trees and brush will be estimated by the engineer. In localities free from brush, and where less than twenty trees over five inches in diameter at the butt are cut down and removed from an acre of surface, no allowance for grubbing and clearing will be made.

Limit of grubbing and clearing.

General definition.

20. **Excavation.**—Under this term will be included all excavation in trenches, pits, shafts and tunnels, together with all back-filling and embankments that may be needed for the construction of the conduit and its appurtenances, or that may be necessary for the laying, changing and construction of any drain-pipes, culverts, drainage ditches or water-courses, either under or over the proposed conduit, or for any other incidental work that may be ordered by the engineer. It is understood that any excavation which may be necessary for the formation of any roadway required by the contractor, other than as hereinafter specified, must be done at his own expense.

Excavation in rock.

21. **Classification of excavated material.**—The removal, handling, refilling and transportation to embankments, or spoil banks, of hard and compact ledge or rock which, in the opinion of the engineer, requires to be loosened by blasting, or of boulders of 20 cubic feet or more in volume, will be estimated as rock excavation.

Excavation in earth.

22. The removal, handling, refilling and transportation to embankments or spoil banks of all earth, loam, clay, sand, gravel, quicksand, mud, muck, hard-pan, stones and boulders of less volume than 20 cubic feet, and all other objects and substances that may be found below the existing surface of the ground in any locality,

except rock as above specified, will be classified as earth excavation.

Only two classes of excavation paid for, and conditions.

23. Only the above-mentioned two classes of excavation, rock and earth, will be considered throughout the entire work herein contemplated. The quantity of excavation will be estimated as herein specified, and will be paid for according to the prices bid per cubic yard therefor, under the following different conditions:

(*a.*) In roadway grading, along the axis of the conduit, where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of permanent new channels for water-courses carried over the conduit.

(*b.*) In open trenches or pits for the conduit, gate-house, overflow chambers, culverts or other structures.

423 (*c.*) In shafts connected with tunnel-work for the conduit.

(*d.*) In tunnel-work for the conduit.

What the prices for excavation must include.

24. The prices bid for the excavation of the aforesaid two classes of material, must furthermore include the cost of all necessary labor, tools, appliances, lifting from trenches, hauling through tunnels, hoisting through shafts, refilling in trenches or elsewhere, rehandling, transporting to spoil banks and embankments, and the proper formation of such embankments and spoil banks, provided that the length of the average haul from the place of first deposit on the side of any open trench or excavation, or from the ends of the tunnel, or the top of any shaft, to the place of final disposal does not exceed 1,000 feet by the shortest practical route which the engineer may designate; but when such haul is longer than 1,000 feet as aforesaid, the additional price bid per cubic yard for hauling on the extra length or distance will be paid. No other separate payment for any excavated material put in embankment will be made.

Overhaul, how estimated.

Contractor to examine ground.

25. **Character of ground.**—The character of the material in which the conduit and its appurtenances are to be built must be determined by the contractor from personal examination or judgment. Wherever borings have been made, as shown upon the preliminary maps and plans for the work, much care has been taken to secure accuracy, but it is herewith expressly understood that none of them are warranted to be correct, and that in case the material shall be found to differ

Accuracy of borings not warranted.

from what is thus indicated, the contractor shall have no claim against the executive board on that account.

Roadway grading paid for.

26. **Roadway grading.**—Before commencing the construction of the conduit, in places where it is contemplated to permanently alter the present conformation of the surface by excavations or embankments, a roadway suitable for the transportation of material shall be constructed along the right of way, and as nearly as practicable over the line or axis of the conduit. Where the original surface of the ground is less than three (3) feet above the grade of the invert of said conduit on each side, or is below said grade, the roadway shall be formed in embankment not less than thirty (30) feet wide at a level of three (3) feet above said grade; and where the original surface of the ground is more than three (3) feet above said grade on each side, the roadway shall be not less than fourteen (14) feet wide, an approximately level top being provided in both cases. The slopes of all embankments to be at least one and one-half ($1\frac{1}{2}$) horizontal to one (1) vertical; in earth excavation, the side slopes shall be at least one (1) horizontal to one (1) vertical, and in rock excavation, the side slopes shall be at least one (1) horizontal to eight (8) vertical. In all cases, the said slopes shall be made as much flatter as the engineer may direct. It is understood that the foregoing refers only to the formation of such roadway wherever specifically required by the engineer.

Widths and side slopes of excavations and embankments.

Formation of embankments.

424 27. In forming the said embankments, the original surface of the ground shall be thoroughly cleared and all vegetable and perishable matter removed. Where such surface has a considerable slope, it shall be cut to level terraces, as will be directed by the engineer. The material to be used in making the embankments shall be of a loamy or clayey character, carefully selected and free from wood, roots, brush, sod, undecomposed vegetable matter and large lumps and stones; said material to be deposited in layers not exceeding eight (8) inches in thickness, and to be thoroughly compacted by heavy rollers, or by the properly directed traffic of the animals, carts and wagons used for transporting the material from the excavations. When the material is so dry as to prevent thorough consolidation, each layer shall be suitably moistened by sprinkling

Time for completing embankments.

with water after being put in place. All embankments must be finished at least one month before commencing the construction of the conduit in or upon the same.

Proper foundation for embankments.

28. Should the original soil in any locality be unsuitable, in the opinion of the engineer, as a foundation for any embankment, the same shall be excavated to such depth as will be directed, and the excavation refilled with satisfactory material, which shall be thoroughly compacted as aforesaid.

Payment for roadway grading.

29. For the above-described work, payment will be made at the *the* prices bid per cubic yard for excavation in grading the said roadway, measured in place after the surface has been cleared. The cost of making embankments and the aforesaid refilling must be included in the prices bid per cubic yard for earth excavation, except when the material for such embankments must be hauled an average distance of more than 1,000 feet, in which case the additional price bid per cubic yard for such extra haul as aforesaid will be paid.

Overhaul.

Open excavation defined.

30. **Open excavation.**—Open excavation will take place for the gate-house, overflow chambers, culverts under the conduit, and for such portions of the conduit as are not constructed in tunnel. Such excavation may be either in earth or in rock, in accordance with the above-specified classification, and shall in all cases be made to the lines and grades given by the engineer from time to time.

Limit of side slopes.

31. In measuring said open excavations for payment, the side slopes will all be estimated at one (1) horizontal to ten (10) vertical in rock, and one (1) horizontal to six (6) vertical in earth.

Limit of bottom widths for structures.

32. For the gate-house, overflow chambers and culverts under the conduit, the size of the said excavations on the bottom will in general be estimated as being one (1) foot wider than the internal diameter of the culvert or drainage pipe laid therein, or one (1) foot wider and longer than the base of any pier, abutment or detached
425 wall, or one (1) foot wider and longer than the base of any masonry structure within the walls of which the earth or other material has been excavated to the level of the foundation of said walls. Where a greater width than said amount is required for the foundation of any such wall or structure, the dimensions shown on the plans therefor, will be used in computing the volume of the excavation, provided that such dimen-

sions are actually obtained; but where said dimensions are not obtained, and the excavation is not enlarged to the specified dimensions for any reason satisfactory to the engineer, only the actual length and breadth of the excavation will be used for the purpose mentioned.

Limit of width at axis of conduit.

33. For the conduit, the width of the trench or pit, at the level of the axis or middle of the conduit, will be estimated as being twenty-two (22) inches greater than the required internal diameter of the masonry at said level in rock, and forty (40) inches greater than said internal diameter at said level in earth; and the excavations for the conduit must in general be made so that not less than the said estimated width at said level shall be actually obtained and be bisected by said axis.

Irregularities of trench

34. Whenever any irregularities in the sides of the trench adjacent to the conduit occur, the same shall be cut away at the contractor's expense sufficiently to afford the required widths on each side of said axis from the bottom up to the level of the top of the backing of the arched roof of the conduit.

Conduit trench in rock.

35. Where the conduit is in rock excavation, the bottom of the trench shall be horizontal transversely, and no part of said bottom shall project above the contemplated grade line for the lowest point of the bottom of the conduit on the interior thereof. If the rock is sound, the said bottom of the trench will in general be left unlined with masonry. The cross-section of the conduit may either be horseshoe-shaped, when masonry side walls are required, or it may be trapezoidal with an arched masonry roof, when such side walls are not required by the engineer, as exhibited in diagrams No. 1 and 2, hereto appended. In all cases the faces of the rock excavation shall be made to conform as closely as practicable to the lines on said diagrams showing the limits of excavation for which payment will be made, and so that no portion of said faces will project within said lines.

Lining masonry may be omitted in rock.

Limits of excavation.

Diagrams showing limits of earth excavation.

36. Where the conduit is in earth excavation, the bottom of the trench shall be excavated for the reception of the invert masonry to the lines, form and depth exhibited in some one of diagrams No. 3, 4, 5, 6, 7 and 8, hereto appended, and showing the limits of excavation for which payment will be made. In said diagrams the bottom of the trench is shown as being circular, polygonal

Choice of cross-sections.

and horizontal, respectively, and the engineer will direct from time to time, as the work
426 progresses, that the excavation shall be made in conformity with such one of said diagrams as he may deem best adapted to the particular locality.

Excavation partly in earth and rock.

37. In cases where an open excavation of more than four (4) feet in depth is to be made in rock which requires blasting, the removal of the material above the surface of such rock will be estimated on the basis that the earth trench is one (1) foot wider than the width of the rock excavation at the surface thereof, as determined by the above rule for width and side slopes.

Measurement of open excavation in earth and rock.

38. No allowance for earth or rock material excavated beyond the aforesaid limits shall be made, except upon the written order of the engineer obtained before the work is performed; nor will the removal of any material below the normal grades given by the engineer for the bottom of the trenches be paid for unless so ordered. Should such unwarranted excavations be made at any point, the same shall be refilled at the contractor's expense to the proper grade in such manner as the engineer will direct. In case the engineer deems it necessary to excavate to a greater width than hereinbefore specified, or to a greater depth in order to secure a good foundation for the conduit or any of the aforesaid structures, the work shall be done by the contractor at the regular price bid per cubic yard for excavation.

Extra width and depth of excavation.

Sheeting, shoring, and caving of excavations.

39. Wherever the sides of the excavation require sheeting and shoring in order to preserve the limits or form of excavation fixed by the engineer, or to prevent injury to the masonry, all such work shall be done and the necessary labor and materials furnished at the contractor's expense; furthermore, all slips, slides and caves of the sides of any open trench or excavation will be at his expense.

Size of excavations.

40. In estimating the volume of excavation, the space occupied by any necessary sheeting, shoring or bracing of the sides will not be considered. The excavation must give ample room for the construction of the masonry in the best manner, as well as for any required sheeting, shoring, pumping, bailing and draining, also for removing any material which the engineer may deem unsuitable for the foundation, even though greater widths of trench or pit than those above specified may, in the contractor's opinion, be required there

for. Said excavation must likewise be maintained in good order at the contractor's expense, during the construction of the masonry and the back-filling. Maintenance.

41. Whenever it may appear from the prices bid that the conduit can be constructed in an open trench more economically than in tunnel, this class of work will be directed, and the excavation shall be made in strict accordance with the plans and directions that will be given by the engineer from time to time. The length of trench to be opened, or area of surface to be disturbed at any one time, will also be determined by the engineer. Open trench and tunnel. Length of trench to be opened.

427 42. In cases where the roadway above referred to has not been excavated to sufficient width to permit of the convenient excavation of the conduit trench, the necessary additional width shall be obtained by excavating in the original soil under the specifications and prices governing the formation of said roadway. Additional excavation for roadway.

43. Materials found in the work suitable for any special use are to be reserved for that purpose. The surface soil covering the location of any open excavation shall, wherever directed by the engineer, be removed and put in spoil banks apart from any other excavated material in such locality, and shall be carefully replaced upon the top of the refilling of such excavation, so as to restore the upper stratum of the ground as nearly as practicable to its original condition. Materials to be reserved. Surface soil to be replaced.

44. **Shaft excavation.**—At such points as the engineer will direct, vertical shafts in general of rectangular cross-section, not less than twelve (12) feet nor more than fourteen (14) feet long, measured along or parallel to the axis of the conduit and in clear of all timbering, nor less than eight (8) feet nor more than ten (10) feet wide, measured horizontally at right angles to said axis and in clear of all timbering, shall be sunk through the earth, or rock, or both, to the required level of the bottom of the tunnel excavation. The exact dimensions of said shafts will be fixed by the engineer within the said limits to accommodate the plant of the contractor, and if the contractor should prefer some other form of cross-section than a rectangle, the same may be adopted if approved by the engineer; but in no case shall the estimate for the excavation of such shafts exceed the volume resulting from the adoption of the extreme rectangular limits above specified. It is Size of excavation. Dimensions may be adapted to contractor's plant. Measurement of excavation where timbered.

also understood that where timbering is required for supporting the sides of any shaft, the excavation will be estimated from the area of a rectangle having sides two (2) feet longer than the cross-sectional dimensions in clear of timbering which will ultimately be fixed by the engineer as aforesaid; furthermore, that where timbering is not required for any shaft in rock excavation, the sides must be truly vertical and neatly excavated to the form and dimensions of cross-section given by the engineer.

Timbering machinery and appliances.

45. The contractor shall furnish, put in place and maintain all planks, timbers and other curbing or bracing material that the sides of the shafts may require during the progress of the work; also all materials, machinery and appliances required for hoisting, pumping, and ventilation. Proper cages must be used for the hoisting of men and materials at all shafts, and every precaution shall be taken to insure perfect safety. The most approved safety catches, of tested efficiency and strength, shall be used in con-
428 nection with the cages to hold them in case of accident. The cost of all such labor and materials, together with the cost of refilling, must be included in the prices bid per cubic yard for excavating earth and rock in the shafts.

Measurement of shaft excavation.

46. The quantity of excavation will be determined from the measured depths and the sectional dimensions as above specified, provided that such dimensions are actually obtained; but if the actual dimensions are in any case smaller than those above indicated, and are allowed to stand without enlargement, then only the volume actually removed will be estimated. In general, all additional excavation beyond the specified limits will be regarded as made at the contractor's expense, unless ordered by the engineer.

Size of excavation.

47. **Tunnel excavation.**—Where the conduit is constructed in tunnel in earth, the excavation shall be made of such size as to afford sufficient clear room between any necessary timbers for properly building the required masonry lining and backing to the form and dimensions shown on the plans. The cross-section of the conduit

Form of cross-section.

may be either circular or horseshoe-shaped, according to the character of the soil, and the excavation will be estimated on the basis that an

Measurement of excavation in earth.

additional space six (6) inches wide around the entire external surface of the required brick or

rubble lining masonry has been removed, as indicated in diagrams Nos. 9, 10 and 11, hereto appended. Any further excavation than this volume that may be required for any reason, will be at the contractor's expense, unless ordered by the engineer, and the cost of furnishing and putting in place all necessary timber, plank, boards, and other supporting materials, must be included in the price bid per cubic yard for tunnel excavation in earth.

Additional excavation.

48. Where the tunnel is excavated in ledge rock, the sides and roof may either be lined wholly or in part with brick, rubble or concrete masonry, or may be left entirely without lining as the engineer may direct. The floor will, in general, be flat and left unlined when formed of sound rock, and the cross-section will be horseshoe-shaped. It is contemplated that the rock excavation shall be made uniform in size and shape throughout, whether lining be required or not, except at such points where the engineer may deem an enlargement of the same necessary for the reception of additional lining masonry; also, that where lining is required by the engineer, the thickness thereof shall ordinarily be eight (8) inches, except as aforesaid.

Lining masonry may be omitted in rock.

Excavation to be uniform.

Exception.

Thickness of lining.

49. Where lining is not required for the sides and roof, the surface of the rock excavation shall be made to conform as closely as practicable to the exterior surface of the horseshoe-shaped conduit, having its side walls and roof eight (8) inches thick, and its floor horizontal transversely and coincident with the contemplated grade line for the lowest point of the bottom of the conduit on the interior thereof, as exhibited in diagram No. 12, hereto appended, and no portion of said rock surfaces shall project within the described lines.

Size where lining is not required.

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50. The same requirements shall also apply where the said excavation is to be lined with masonry eight (8) inches thick, as exhibited in the appended diagram No. 13. If a lining thicker than eight (8) inches is required by the engineer at any point, the excavation shall be made to conform as closely as practicable to the exterior surface of such lining as exhibited in the drawings which will be furnished by the engineer from time to time as the work advances. It is also understood that the bottom of the excavation may be lined with masonry wherever deemed necessary by the engineer, in which event

Size where lining is required.

Bottom lining.

the excavation shall be deepened sufficiently to permit such lining to be laid, so as to bring its upper surface upon the contemplated grade of the bottom of the conduit.

Measurement of excavation in rock.

51. Where lining is not required by the engineer, payment for rock excavation will be made at the price bid per cubic yard therefor in tunnel, on the basis that the entire volume contained within a line drawn three (3) inches outside of and parallel to the exterior surface of the aforesaid horseshoe-shaped conduit having its side walls and roof eight (8) inches thick, and within the aforesaid horizontal bottom line of the excavation, has been removed, as per said diagram No. 12; and where lining is required by the engineer, the excavation will be estimated on the basis that the entire volume contained within a line drawn six (6) inches outside of and parallel to the exterior surface of the required brick or rubble lining masonry of the sides and roof, whether the same be eight (8) inches or more in thickness, and within the aforesaid horizontal bottom line of the excavation, has been removed, as per said diagram No. 13; and in case that any lining is required by the engineer on the bottom of the tunnel, the excavation will be estimated on the basis that the entire volume contained within the abovementioned line around the sides and roof, and within a line drawn three (3) inches outside of and parallel to the exterior surface of the required masonry bottom lining, has been removed, as per diagram No. 14, hereto appended.

Excavation outside of limits.

52. All rock material that may be excavated for any reason by the contractor outside of the said lines, will be at his expense; and wherever any lining is required, the excess of volume thus excavated shall be filled solidly at his expense with concrete, brick or rubble masonry, or such other material as the engineer may direct. The cost of furnishing, putting in place and removing all necessary timber, planks, boards or other supports must also be included in the price bid per cubic yard for tunnel excavation in rock.

Refilling.

Cost of timbering.

Limits of tunnel, shaft and open excavation.

430 53. **General, relating to tunnel, shaft, and open excavations.**—Tunnel excavation will be estimated as beginning at the ends of the open-trench work for the conduit, and ending at the sides of the shaft excavations, the latter not being classed as tunnel. Should any shaft be located on one side of the tunnel, instead of directly over the same, the additional volume of

excavation necessary to connect the shaft with the tunnel will be estimated as tunnel-work.

Conformity with lines and grades.

54. The utmost care shall be taken by the contractor to make the excavations in all classes of material true to the lines and grades given from time to time by the engineer. Any deviations from said lines and grades shall be corrected at the contractor's expense, and no allowance for any additional excavation or masonry incurred thereby will be made. In soft material of any kind, every precaution shall also be taken to prevent the formation of cavities of any magnitude behind the planking, timbering or other supports; and wherever any such cavities occur, they shall at once be compactly filled by properly ramming in suitable material with tools specially adapted to the purpose. In rock excavation, the drilling and blasting must be conducted with all possible care, so as not to shatter the sides of the trench, shaft or tunnel, outside of the lines determined by the engineer.

Filling of cavities behind timbering.

Care in blasting.

Additional excavations on engineer's order.

55. The engineer may at any time give a written order for additional excavations to be made for chambers and sumps at the bottom of any shaft, or for skewbacks for arches and other purposes in the tunnel and shafts; all additional excavations thus ordered shall be made by the contractor according to the lines and directions of the engineer, and will be paid for at the prices bid per cubic yard for excavating the same class of material in tunnel or shafts, respectively.

Payment.

Enlargement of excavations on engineer's order.

56. If, after any shaft or tunnel excavation or open trench has been made of a certain size by direction of the engineer, he is of opinion that the nature of the rock or other material is such that the form or dimensions of the masonry for which said excavation was intended must be increased, he may give a written order for an enlargement of said excavation for the purpose of increasing said form or dimensions, and the contractor shall make such enlargement, which will be measured according to the lines given by said engineer, and paid for at the prices bid per cubic yard for excavating the same class of material in shaft, tunnel or open excavation, respectively.

Payment

Responsibility for timbering.

57. The contractor shall be responsible for properly supporting the roof and sides of the tunnel and the sides of the shafts with timber, plank, or other supports; but the timbering, etc., must in all cases be so arranged as to leave ample room for all necessary pipes and appliances required in

Room for pipes, etc.

the prosecution of the work, as well as for
431 the convenient use of the engineering instruments and apparatus needed for giving proper line and grade marks in the tunnel. If the engineer is of opinion that sufficient and proper supports have not been provided, suitable additional supports shall at once be put in place at the contractor's expense, although such action will not relieve or release said contractor from his responsibility for the sufficiency of such supports. The foregoing provisions shall also be applicable to the case of open trenches. All caves or falls of material in the shaft and tunnel work shall be promptly removed, and the spaces properly filled out at the contractor's expense.

Additional supports may be ordered by engineer.

Caves and refilling same.

58. All timber-work is to be removed from the sides of the shafts and tunnel as the masonry therein advances; but if, in the opinion of the engineer, any timber-work be so located in said sides that its removal would endanger the safety of the masonry, it shall be left in place, and all cavities about it shall be filled solidly with mortar, concrete, masonry, or such other material as the engineer may direct. No payment for any such timber-work will, however, be made to the contractor; nor shall any timbers or braces extending across the interior of the conduit or tunnel be left permanently in place under any circumstances.

Removal of timbering. Exception.

Filling cavities.

Cost of timbering.

Removal of braces.

59. **Power, appliances, and ventilation.**—The power to be employed in driving the tunnel through rock shall be compressed air, or such other agency as may be approved by the engineer, which must be applied by the most approved method. If a shield is used for tunneling in soft ground, hydraulic power may be provided if sufficient force to move the shield cannot be secured by other means. The contractor shall also provide, use and maintain at his expense, appliances for excavating, drilling, blasting, hauling, hoisting and transporting materials, for lighting or ventilating purposes, and for all other operations connected with the excavation, support and construction of the tunnel and shafts, of such character, number and capacity as will amply secure the rate of progress required. If at any time before the commencement or during the progress of the work, such appliances appear to the engineer to be insufficient or inadequate for securing the quality and quantity of work required, the contractor shall promptly increase

Power used in tunnel-work.

Shield.

Appliances to be furnished and maintained.

Increasing number and efficiency of appliances.

their efficiency and number, or improve their character; but the failure of the engineer to demand such increase or improvement shall not relieve the contractor from his obligation to secure the specified rate of progress.

Proper ventilation to be provided.

60. The tunnel and shafts shall at all times be provided with abundant ventilation, and be kept free enough from smoke and noxious gases from explosives, or emanating from the soil or rock, to enable the workmen and inspectors to properly and safely perform their duties. When instrumental work of any kind is to be done in the tunnel or shafts by the engineer or his as-
432 sistants, due notice will be given to the contractor or his agent, and special care shall be taken to remove completely all smoke and gases in ample season for the proper performance of such work. Should the facilities furnished by the contractor for securing such required ventilation and complete removal of smoke and gases be inadequate at any time, the engineer shall have the right to immediately provide, put in place and maintain all necessary appliances for the purpose at the contractor's expense, the entire cost of the same, if advanced by the executive board, to be deducted from any moneys due or to become due to the contractor on account of the tunnel-work; and it is also expressly understood that whenever the engineer deems it necessary to take such action, no forcible opposition thereto shall be made by the contractor or any of his employees, but on the contrary the latter shall faithfully render such assistance as said engineer may require of them.

Improvement of ventilating facilities.

Contractor to assist.

Ventilation holes drilled in rock.

61. At such intervals as the engineer may designate, ventilation holes not less than six (6) inches in diameter, shall be drilled through the rock vertically over the axis of the tunnel, wrought-iron pipes of said diameter being used for passing through the earthy strata from the surface to the rock. The upper ends of such pipes must project about four (4) feet above the surface of the ground, and have a screw-thread cut thereon for the attachment of a suitable iron covering hood. Payment for such ventilation holes as may be ordered by the engineer will be made at the prices bid per lineal foot of iron pipe driven and per lineal foot of drilled hole through rock, the estimated or measured length of the latter to terminate at the roof of the tunnel excavation; and in case that the tunnel is entirely in

Ventilation pipes driven through earth.

Payment for such ventilation holes and pipes.

earth said pipe to terminate at the inner face of the crown of the brick arch.

Facilities for lighting tunnel.

62. The contractor shall provide and maintain during the construction of the work all necessary facilities and appliances for properly and safely lighting the tunnel and shafts where workmen are engaged, or where the engineer and his assistants may be attending to their duties. The utmost

Precautions against danger.

care shall be taken to guard against danger from the presence of deleterious, inflammable or explosive gases at all points of the work, and the contractor will be held responsible for all loss,

Cost of lighting.

costs and damages to persons or property resulting therefrom. The cost of said lighting must be included in the prices bid per cubic yard for excavation and masonry.

Draining open excavations.

63. **Bailing and Draining.**—The open excavations, shafts and tunnel, must at all times be kept as free as possible from water, and the contractor shall furnish and maintain sufficient pumping appliances to accomplish this end to the engineer's

Removal of water.

satisfaction. Water from the excavations, or from any pipes, drains, or other water-
433 courses that may be interfered with, shall be conveyed to suitable points of discharge, as may be directed. No water shall be allowed to rise on any masonry, or to flow over the

Set of mortar.

same, until the mortar has attained a proper set, as will be determined by the engineer. All damage, of whatever character resulting from such drainage of the works, must be paid by the contractor.

Responsibility for damage from water.

Use of drain-pipe in subtrenches.

64. Where required by the engineer, the proper drainage of the bottom of any open excavation shall be effected by one or more lines of suitable drain-pipe, each laid in a shallow subtrench below the required graded surface of the bottom of the main trench. Said drain-pipe shall be of hard-

Quality of pipe.

burned clay, or vitrified earthenware, of the best quality, satisfactory to the engineer in shape and size, sound in all respects, and free from cracks

Manner of laying.

and other defects; they shall also be carefully bedded and laid to proper line and grade, and the joints must be made tight enough to prevent gravel, sand and mud from passing through them. When considered necessary, the joints shall be wound with strips of thin cloth, to serve as a filter in preventing the entrance of earthy matter. The

Refilling of subtrenches.

refilling of the subtrenches about the drain-pipe shall be solidly made with selected material and in the best manner, as will be directed.

Drain-pipe laid by engineer's order.

65. The contractor shall, on receipt of a written order from the engineer, furnish and lay all such drain-pipe which the latter may deem necessary in any locality; and he will be paid therefor at the same rate per lineal foot at which said pipe can be purchased from manufacturers and delivered at said locality by the executive board, with an additional allowance of five (5) cents per lineal foot for all pipe actually laid in accordance with the engineer's directions; such payment to include the cost of excavating and refilling the subtrenches, laying the pipe, winding the joints, board foundation where necessary, and all other labor and materials required in the work.

Payment.

Drainage channels in rock excavations.

66. Wherever, in the opinion of the engineer, special means are necessary for draining the tunnel in rock excavation, a small drainage channel shall be cut in the properly graded floor to such depth, as to free entirely from water those portions of said floor on which any masonry is to be laid. Payment will be made for such drainage channels cut in said rock floor at the rate of ten (10) cents per lineal foot, the written order of the engineer for making said channels to be previously obtained in all cases. Any subsequent enlargement of said channels to dimensions that may be found entirely adequate for the removal of the water as the work advances, as well as the cost of furnishing and laying any drainage tile or pipes in such channels which are to be afterwards removed in localities where no masonry bottom lining is required, will be at the contractor's expense. In places, however, where the tunnel is to be provided with a masonry invert or bottom, and where such a drainage channel has been excavated and must be kept in use after the completion of said invert, a suitable drain-pipe shall be laid as above described in said channel in accordance with the engineer's direction, and payment will be made therefor at the same rate per lineal foot at which said pipe can be purchased from manufacturers and delivered at said locality by the executive board; but it is understood that the diameter of such pipe shall not exceed ten (10) inches in any case, and that payment for the excavation in earth of the required trench for said pipe, along with the proper laying of the same therein, will be made at the rate of five (5) cents per lineal foot.

Payment.

Enlargement of drainage channels.

Use of pipes in drainage channels.

Payment.

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Responsibility for sufficiency of drain-pipes.

67. The contractor shall be held responsible for the sufficiency of all the aforesaid drain-pipe in the tunnel, and it is expected that he will arrange his pumping appliances in such manner as to render the use of pipes larger than (10) ten inches in diameter unnecessary; but if, for any reason, it should be found necessary to use anywhere such larger pipes in order to remove the water and protect the masonry to the engineer's satisfaction, the contractor shall provide them, and the additional cost thereof, beyond that of said ten (10) inch pipe, must be included in the amount bid for bailing and draining. At suitable intervals, openings shall be made into said drain-pipe, and in the masonry invert of the tunnel, for admitting the drainage water, said openings to be properly protected during the progress of the work, and to be solidly filled to the bottom of the pipe with concrete and mortar on its completion. Where required by the engineer, the said drain-pipe shall be laid with cemented joints in the best manner, and without additional compensation beyond the prices above named.

Enlargement of drain-pipes.

Openings into drain-pipes.

Closing of same.

Pipes laid with cemented joints.

Gross sum for bailing and draining.

68. The entire cost of all labor, appliances and materials, other than as above stated, that may be required in the proper maintenance of all excavations, and the removal or exclusion of water therefrom, by pumping or otherwise, must be included in the gross sum bid for bailing and draining.

Embankment over conduit.

69. **Embankment.**—When the grade for the bottom of the trench for the conduit is less than eleven (11) feet deep below the original surface of the ground, or the surface of the roadway above described, the conduit shall be surrounded and covered with an embankment of carefully selected material of a loamy or clayey character, which must be free from wood, roots, brush, sod, undecomposed vegetable matter and large lumps, stones or pebbles. The materials must also be loose and in such condition as to admit of being thoroughly compacted by suitable rollers, by pounding, or by the properly directed traffic of the animals, carts and wagons used for transporting it from the place of excavation. It shall be deposited evenly on both sides of the conduit, in layers not more than six (6) inches thick, and of such width on each side as may be necessary to form a durable and impervious embankment, having slopes of not less than one and one-half ($1\frac{1}{2}$) horizontal to one (1) vertical, and a horizontal

Character of materials.

Deposited in layers.

435

Widths and side slopes.

top width of at least nine (9) feet at a level three and one-half ($3\frac{1}{2}$) feet above the crown of the masonry arch, it being understood that said top width is exactly bisected by the center line of the conduit.

Consolidation.

70. The layers shall be thoroughly consolidated by moistening, rolling or pounding, or by the traffic over the same as heretofore described, and as the engineer may direct, special care being taken in the performance of the work next to the exterior of the masonry, and for a distance of several feet beyond. The embankments must be finished before the centering of the masonry arch is removed, and during the progress of the work the side walls of the conduit must be securely braced to prevent deformation from undue and unbalanced pressures. On the completion of the work, the top and side slopes of all such embankments shall be neatly formed to true lines and surfaces, upon which any surplus rock material may afterwards be deposited to such thickness as the engineer may direct.

Completed before removing centering.

Shaping top and sides.

Embankment around structures.

71. Where the surface of the ground around said structures is to be raised by embankment, the work shall in general be done as above specified for filling over the conduit, except that above the highest water level somewhat coarser materials may be used, and the dimensions of the embankment varied in accordance with the directions of the engineer.

Payment.

72. The cost of making said embankments, must be included in the price bid per cubic yard for excavation, except when the material for such embankment must be hauled an average distance of more than 1,000 feet, in which case the additional price bid per cubic yard for such extra haul, as aforesaid, will be paid.

Piles.

73. **Timber-work in foundations.**—The contractor shall, when required, construct a foundation of wooden piles or timbers for the conduit and its appurtenances. The piles shall be of oak, ash, chestnut, elm or spruce, straight, sound, not less than six (6) inches in diameter under the bark at the point, and of sufficient length to drive well into the substratum. The required length of the piles will be determined from borings to be made at the contractor's expense, after the excavation has reached the grade contemplated by the engineer. Piles driven twenty feet or more shall not be less than ten (10) inches in diameter under the bark at the place where they are cut off for cap-

Length and diameter.

ping; and of those driven to a less depth, a certain proportion, to be determined by the engineer, may have a diameter of not less than eight (8) inches at said place of cutting off. All piles broken or seriously injured while driving, or driven off from the required lines, must be replaced at the contractor's expense.

Driven in rows and sawed off.

436 74. The piles shall be driven in rows, according to the engineer's directions, and shall be sawed off evenly at the required grade, so that the timber caps which rest upon them will have a firm and even bearing. The pile-work will be paid for at the price bid per lineal foot of each pile satisfactorily driven in the foundation, not including the ends which were sawed off.

Payment.

Capping timber.

75. For capping the piles, suitable oak, ash, chestnut, spruce or pine timbers shall be used. All such timber must be straight, sound, of good grain, and free from cracks, shakes, loose knots, bark, rot, and other defects that may impair its strength and durability, and shall be sawed to such dimensions as will be directed. Similar requirements will be made for the timber which is to be used for placing directly upon the bottom of excavations as a foundation. The caps for piles are to be securely fastened to the latter with wrought-iron drift-bolts, of such diameter and length as the engineer will direct, one such bolt being driven into the top of each pile.

Drift-bolts for capping timbers.

Filling spaces between piles.

76. The spaces between the piles, and between the said caps up to the level of the top thereof, shall be back-filled with such material and in such manner as the engineer may direct. If this material is the same as was excavated in the locality, the cost of said back-filling must be included in the price bid for excavation.

Timber foundation.

77. When a timber platform is to be used as a foundation, the sills will be laid either transversely or longitudinally at such intervals as will be directed, and in such a manner as to cause each timber to be firmly and securely bedded upon the soil throughout its entire length, and to have the upper faces of the timbers all in the same plane, as contemplated by the drawings.

Filling spaces between timbers.

The spaces between said timbers shall be compactly filled out with concrete, or such other material as the engineer will direct, well pounded and rammed into place, and brought up even with the top of the sills, whereupon a flooring of plank shall be securely spiked to each sill, with spikes of such dimensions as will be directed

Where the timbers are required to be placed close together, the spaces between the same shall be filled with cement grout, if required.

Plank flooring.

78. The plank flooring shall be entirely of sound oak, or pine, of good grain, and free from shakes, cracks, large or loose knots, bark, rot and other defects. The planks must be sawed to a uniform thickness, and have straight and parallel edges throughout, so that they can be laid close together upon the sills. All spaces between the planks shall be filled with cement grout, if required, and the ends of the planks shall be sawed off squarely and evenly where they abut, so as to make a close joint.

Filling spaces.

Cradle.

437 79. If a cradle is used in any locality as a foundation for the conduit, it will consist of strong transverse ribs of plank, cut to the required form and well spiked together, and a single or double lining of boards or planks, securely nailed to each rib. The planks and boards used for this purpose shall be of the best quality, uniform in thickness, straight-edged and laid so as to make the work as watertight as practicable.

Precautions in draining foundations.

80. Where a pile or timber foundation is used the contractor must exercise the utmost care to prevent the material underneath from being washed away by any of the pumping, bailing and draining operations, or otherwise; and if the use of suitable drain-pipe in the foundation has for any reason been omitted, the pumps must be shifted frequently to avoid damage from undermining caused by drainage from too long a distance.

Payment for timber and plank.

81. The timber and plank used in foundations and left permanently in place, as aforesaid, will be paid for at the price bid per thousand feet, B. M., it being understood that the quantities will be computed from measurements or estimates of the amount actually left in the work in accordance with the plans and directions of the engineer, and with no allowance for loss or waste.

Payment for iron-work in foundations.

82. The iron-work furnished and put in place by the contractor in said foundation, including fastening, will be paid for at the price per pound bid therefor, the quantities being determined by measurements or estimates of the amounts actually driven in the work in accordance with the plans and directions of the engineer, and with no allowance for loss or waste.

Tests.

83. **Cements.**—All cement used in the work,

for the purposes hereinafter specified, will be subjected by the engineer to rigorous tests, and if found of improper quality at any time, it will be rejected. As far as its general character and tensile strength is concerned, the quality of natural and Portland cements furnished by the contractor will be judged by the following-described tests and conditions:

Natural cement.

84. The American natural cement must be freshly burned, and be equal in quality to the best brands of Buffalo, Rosendale or Improved Union

Fineness.

cements. It shall be ground so fine that at least 92 per cent. in weight will pass through a standard sieve of 2,500 meshes to the square inch, and shall be free from excess of lime, as determined by the usual tests for "blowing." When tested neat, it shall have, at the end of twenty-four hours,

Tensile strength.

a tensile strength of at least 50 pounds per square inch, after the exposure of the briquettes in air for one hour or until set, and for the remainder of the twenty-four hours in water of about 60 degrees F.; and when exposed for one day in air and six days in water, as aforesaid, it shall attain a tensile strength of at least 100 lbs. per square inch.

Portland cement.

438 85. The American or foreign Portland cement used shall be ground to a greater de-

Fineness.

gree of fineness than above specified for natural cements, and shall also be free from excess of lime. When tested neat, it shall have, at the end of

Tensile strength.

twenty-four hours, a tensile strength of at least 100 lbs. per square inch, after exposure of the briquettes in air for one hour, or until set, and in water of about 60 degrees F. for the remainder of the twenty-four hours; and when exposed for one day in air and six days in water, it shall attain a tensile strength of at least 350 lbs. per square inch.

Protection from moisture.

86. The cements must at all times be kept thoroughly protected from the weather, and all such as may have become injured by dampness or moisture will be rejected. Portland cement

Delivery.

must be delivered at the site of the conduit at least one month before it is required for use, and shall, if required by the engineer, be spread out and exposed to the air under close shelter in layers not more than six (6) inches thick, for at least

Samples for testing.

two weeks before being used. Samples for tests will be taken by the engineer as frequently as he may deem expedient, and no charge for the material thus taken shall be made by the contractor. Each sample to be sufficient in quantity for mak-

ing at least five standard briquettes of one square inch sectional area.

87. **Sand for mortar.**—The sand to be used in making mortar shall be clean, sharp and free from any appreciable admixture of dust, dirt, earth, clay, loam or vegetable mould. Any sand containing in the aggregate more than seven per cent. of its volume of such impurities will be rejected, or else it must be freed therefrom by washing. For stone-work and brick-work, the sand shall also be of such grain that at least 70 per cent. of its volume will pass through a sieve of 400 meshes per square inch and be retained upon one of 1,600 meshes per square inch; and if it contains pebbles in considerable quantity, the same shall be removed by proper screening. For concrete, the sand need not be screened, if otherwise of a quality satisfactory to the engineer.

Quality of sand.

Size of grain.

Sand for concrete.

88. **Mortar.**—All mortar shall be prepared from cement in perfect condition, and from clean sand, as aforesaid, thoroughly mixed together dry in the following proportions by volume or measure:

Mortar.

(*I*)—*Natural cement mortar:*

(*a.*) For pointing, 1 part of sand to 1 part of cement.

(*b.*) For brick masonry, 1½ parts of sand to 1 part of cement.

(*c.*) For stone masonry, 2 parts of sand to 1 part of cement.

(*II*)—*Portland cement mortar:*

(*d.*) For pointing, 1½ parts of sand to 1 part of cement.

(*e.*) For brick masonry, 2 parts of sand to 1 part of cement.

(*f.*) For stone masonry, 2½ parts of sand to 1 part of cement.

439 89. Should the sand be of inferior quality in any respect, the engineer shall have the right to reduce the proportion of such sand in the preparation of mortar without claim for extra compensation on the part of the contractor. The mixing of the sand and cement must always be done upon a suitable plank or stone platform, and in no case directly upon the ground. After such dry mixing, clean, fresh water, shall be added in sufficient quantity to produce a paste of proper consistency, the whole to be thoroughly worked with hoes or other tools. All excess of water must be carefully avoided. The mortar must be freshly mixed in comparatively small quantities for the

Inferior sand.

Mixing on platforms.

Water.

Fresh mixing.

work in hand, and no mortar shall be used which has been tempered long enough to have acquired an appreciable set, as the retempering thereof will not be allowed. Furthermore the mortar shall always be deposited upon and taken from suitable plank or board platforms.

Plank platforms.

Concrete, where used.

90. **Concrete masonry.**—Concrete masonry may be used for the foundations and backing of the walls of the gate-house, overflow chambers, conduit, culverts and other structures built in open excavations; for filling the space between the sides of the excavation and the exterior of the masonry lining of the tunnel and shafts; and it may also be used as a substitute for stone or brick masonry in any portion of the entire work where such a substitution may be deemed expedient by the engineer.

Substitute for other masonry.

Classes of concrete.

91. The concrete masonry will be made with natural cement or Portland cement, in the manner hereinafter specified, and when used by direction of the engineer, will be divided into the following classes, and payment for the estimated quantities of such masonry in each class will be made according to the prices bid per cubic yard for such class and quality:

(*a.*) All concrete masonry made with natural cement and used in the foundations, backing and walls of the conduit, gate-house, overflow chambers, culverts and other structures built in open excavations.

(*b.*) All concrete masonry made with Portland cement and used in the foundations, backing and walls of the conduit, gate-house, overflow chambers, culverts and other structures built in open excavations.

(*c.*) All concrete masonry made with natural cement and used in the foundations and backing of any lining masonry built in the tunnel and shafts.

(*d.*) All concrete masonry made with Portland cement and used in the foundations and backing of any lining masonry built in the tunnel and shafts.

Ballast material.

92. The ballast material for concrete shall consist of clean gravel, or fragments of hard and durable stone or brick, broken to such size as will pass freely in largest dimensions through a two (2) inch ring, or a mixture of said materials. The gravel stones must also be capable of passing through said ring, but all sand and pebbles smaller than one-fourth ($\frac{1}{4}$) inch in diameter shall

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be screened out. All of this material shall be free from dirt, earth, clay, and other improper substances, and when necessary or required by the engineer, it shall be washed before being mixed with cement or mortar. Cleaning.

93. To form the concrete, the following proportions in units of volume of the component materials, shall be adopted:—One (1) part natural cement, two (2) parts sand, and five (5) parts ballast; or if Portland cement is used, one (1) part Portland cement, three (3) parts sand, and seven (7) parts ballast; the quality of said materials to be as above described. The sand and cement shall first be properly mixed together dry and formed into mortar, whereupon the ballast shall quickly be added and thoroughly mixed with said mortar in an approved machine, or by repeatedly turning over with shovels upon a suitable plank platform. As soon as the mixing is completed, the concrete must be deposited rapidly in layers in the place where it is required, and be thoroughly pounded or rammed in a manner satisfactory to the engineer until the water flushes to the surface, and all the interstices between the stones or pebbles are entirely filled with mortar. Should voids be discovered when the forms are taken down, or otherwise, the defective work is to be removed and the space refilled with suitable material in a proper manner at the contractor's expense. Proportions. Mixing. Depositing in place and ramming. Defective work.

94. The concrete shall be allowed to set for a sufficient time after being deposited in place as aforesaid, before walking over or working upon its surface is permitted. The time thus required will be determined by the engineer. Where forms are required to hold the concrete in place, they shall be furnished at the contractor's expense, and set true to the lines designated, and shall be firmly secured until the material has hardened. Time for setting. Forms.

95. When concrete is deposited against the plank sheeting of the conduit trench or other open excavation, at any point, such sheeting must be left in place for the depth thereof thus covered, and the same will be paid for, up to said height and for a thickness of not more than two (2) inches, at the rate of fourteen (14) dollars per thousand feet B. M. The quantity of concrete to be paid for will be determined by measurements or estimates of the number of cubic yards of such material deposited in place in conformity with the aforesaid diagrams or other plans and direc- Sheeting to be left in place. Payment for sheeting left. Measurement.

Unnecessary excavation to be filled.

tions of the engineer. When the said excavations are made wider or deeper than called for by said diagrams, plans and directions, the extra volume thus excavated shall be completely filled out at the contractor's expense with concrete,
441 wherever the use of such material was contemplated for foundation or backing purposes, except in cases where, in the opinion of the engineer, the unauthorized extra depth may safely be refilled to the required grade with other material. In cases, however, where the width or depth of the excavation is appreciably less than the dimensions required by said plans and directions, and where the engineer has given his explicit consent to the maintenance of such smaller dimensions, only the actual volume of concrete put in place, as determined by measurement or estimate, will be paid for.

Smaller excavations than required.

Brick-work, where used.

96. **Brick masonry.**—Brick masonry may be used for the foundations, lining and walls of the gate-house, overflow chambers, the inside lining of the conduit, culverts and other structures built in open excavations and for the lining of the tunnel and shafts; and it may also be used as a substitute for stone or concrete masonry in any portion of the entire work where such a substitution may be deemed expedient by the engineer.

Classes of brick-work.

97. The brick masonry will be laid with Portland cement mortar in the manner hereafter specified, and when used by direction of the engineer, will be divided into the following classes, and payment for the estimated quantities of such masonry in each class, will be made according to the prices bid per cubic yard for such class.

(*a.*) All brick masonry in the gate-house and overflow chambers, built in open excavations.

(*b.*) All brick masonry in the conduit, manholes, culverts and minor structures built in open excavations.

(*c.*) All brick masonry built in the tunnel and shafts.

Quality of brick.

98. The brick to be used in the work shall be of best quality, new, whole, sound, compact, burned hard entirely throughout, free from injurious cracks, and with true and even faces and edges. They shall be culled by capable men, furnished by the contractor, as they are delivered upon the work, and all that are badly broken or very defective shall at once be broken up for use in con-

crete, or else removed from the locality. Hard-burned bricks, less perfect than those required for the conduit or for face-work in walls, and a small proportion of bats, which may be satisfactory to the engineer, may be used in the outer rings of manholes and in the core of walls more than two feet thick. The brick must have a crushing strength of not less than 4,000 lbs. per square inch in any direction.

Crushing strength.

99. The bricks shall be thoroughly wet just before laying, and the mortar shall be of the quality above described. They shall be laid to a line, with the beds in the line of the radii of the curves, and with as close joints, not exceeding one-fourth (¼) inch for face-work, as may be directed from time to time. Every brick shall be completely imbedded in mortar at its bottom, side and end, at one operation. In no case shall any joint be made by working mortar into the same after the brick has been laid; nor shall any portion of the brick-work be laid dry and afterwards grouted. In the side walls and invert of the conduit, where the cross-section is not a circle, the bricks must be laid with the English bond, one header course alternating with not more than four stretcher courses, and with a header course at the top and bottom of said walls. In semi-circular arches having a smaller radius than five (5) feet, the bricks shall be laid in concentric rings, each longitudinal line of bricks breaking joints with the adjoining lines in the same ring and in the ring underneath; the thickness of the mortar joints between such rings to be not more than three-eighths (⅜) inch. These provisions shall also be applicable to all culverts, manholes, shafts or circular openings in foundation walls, which it may be designed to construct of brick-work.

Brick to be wetted.

Manner of laying.

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In side walls and invert of conduit.

In large arches.

Provisions applicable to other structures.

100. All intersections of manholes and shafts with the conduit shall be neatly groined in the best and most workmanlike manner, and particular attention shall be given to the proper keying of the tunnel arches. At all places where there is a change in the shape of the masonry, as well as at all curves, angles, shafts, chambers, etc., the masonry shall be built carefully to the required forms and lines; and where the section of the conduit is horseshoe-shaped, with a brick invert, specially moulded skewback bricks shall be used at the junction of said invert with the side walls. Care shall be taken to have all the interior sur-

Groining.

Keying of arches.

Changes of form.

Skewback bricks.

Surfaces to be smooth.

faces smooth, true and regular, and the same shall also apply to all exterior surfaces of structures which are to remain permanently exposed to view. The interior surface of the conduit shall

Cleaning and pointing.

be rendered smooth by scraping off all projecting mortar within two days after removing the centering, and by carefully pointing the joints where required. Only thoroughly experienced and skillful mechanics shall be employed on the work.

Manner of laying brick in structures.

101. The brick-work in the foundation and other walls of all structures pertaining to the conduit, shall be laid with the English bond, one header course alternating with not more than three stretcher courses, and in such manner as to make the bricks in each course break joints with those of the courses above and below, by overlapping to the extent of from one-fourth to one-half the

Mortar joints.

length of a brick. The mortar joints shall in general be one-fourth ($\frac{1}{4}$) inch thick, and shall not exceed three-eighths ($\frac{3}{8}$) inch in thickness in any place. Special care must be taken to secure the strongest kind of bond at all angles and corners.

Unfinished brick-work.

102. All unfinished brick-work must be properly "racked back" or "toothed," as directed, and when new work is joined to it, the surface of the bricks previously laid must be scraped and thoroughly cleaned by scrubbing with a stiff brush, and be well moistened just before

Progress of work.

443 fresh mortar is applied thereto. The construction of the masonry in the conduit and tunnel must progress simultaneously with the work of excavation unless otherwise permitted.

Cleaning and plastering backing masonry.

103. The whole interior face of the rubble or concrete backing or foundation, against which the brick lining of the invert, the brick side walls of the conduit, or the brick walls of any structure thereto pertaining are to rest, shall be thoroughly cleaned and then plastered over with a coating, at least three-eighths ($\frac{3}{8}$) inch thick, of the same kind of mortar as above specified for brick-work. In case that concrete backing for the side walls of the conduit is used and put in place while such walls are being built, the rear face of the brick-work shall be plastered over thickly with said mortar, after which the concrete may be deposited

Filling interstices in work.

and rammed, care being taken to completely fill out all interstices between said walls and the side of the trench or sheeting, also to securely brace the brick-work to prevent any deformation thereof.

Plastering exterior of conduit arch.

104. The entire extrados of the upper arch of the conduit, above the springing line thereof, where built of brick in open excavations, shall also be carefully cleaned and plastered over, at the contractor's cost, with a coating of mortar at least one-half (½) inch thick, to be applied before the backing is put in place, and to be kept from injury during the latter operation, or to be thoroughly repaired if injured. This provision shall also apply to the case of exterior surfaces of all manholes and arches in shafts, culverts, or elsewhere.

Applicable to manholes, etc.

Rubble masonry, where used.

105. **Rubble masonry.** — Rubble masonry may be used for the foundations and backing of the walls of the gate-house, overflow chambers, conduits, culverts and other structures built in open excavations; for filling the space between the sides of the excavation and the exterior of the masonry lining of the tunnel and shafts; and it may also be used as a substitute for concrete or brick masonry in any portion of the entire work where such a substitution may be deemed expedient by the engineer.

Classes of rubble masonry.

106. The rubble masonry will be made with natural cement, or with Portland cement, in the manner hereinafter specified, and when used by direction of the engineer, will be divided into the following classes, and payment for the estimated quantities of such masonry in each class will be made according to the prices bid per cubic yard for such class and quality:

(*a.*) All rubble masonry made with natural cement and used in the foundations, backing and walls of the gate-house and overflow chambers built in open excavations.

(*b.*) All rubble masonry made with Portland cement and used in the foundations, backing and walls of the gate-house and overflow chambers built in open excavations.

444 (*c.*) All rubble masonry made with natural cement and used in the foundations, backing and walls of the conduit, manholes, culverts, and minor structures built in open excavations.

(*d.*) All rubble masonry made with Portland cement and used in the foundations, backing and walls of the conduit, manholes, culverts and minor structures built in open excavations.

(*e.*) All rubble masonry made with natural cement and used in the foundations and backing

of any lining masonry built in the tunnel and shafts.

(*f.*) All rubble masonry made with Portland cement and used in the foundations and backing of any lining masonry built in the tunnel and shafts.

Quality of stones.

107. The stones used in the construction of rubble masonry shall be hard, sound, durable, of good size and form, and free from dust, dirt, earth or other improper substance. Cobblestones and round boulders shall not be used unless they are first broken into well-shaped angular pieces. The greater portion of the stones must have beds of at least one (1) superficial foot in area, but in no case shall a stone of such magnitude be laid as to extend entirely through the wall, except where specially directed by the engineer. Care shall be taken to select the largest and best stones for the foundation and for the bond and face work, and to use the smaller ones for filling interstices.

Size of stones.

Manner of laying stones.

108. Each stone shall be laid in the work upon its broadest and best natural or quarry bed upon a thick layer of mortar of the quality above specified, and shall then be thoroughly pounded or settled down into place. The larger stones must be laid so as to break joints with each other, both laterally and transversely, so as to secure the greatest practicable amount of bond and strength; and all spaces or interstices occurring between said stones must be completely filled with said mortar, after which stone chips, fragments or spalls may be thrust therein and hammered down. Care shall be taken to avoid the formation of large and thick pockets of mortar alone, and to place stones of appropriate size and shape, well bedded in mortar, in all spaces or interstices of considerable magnitude. All stones shall be thoroughly wetted just before being laid in mortar, if required. No spalling under a stone after it is laid will be allowed. On the inner or exposed faces of the walls, all points or irregular edges projecting more than one-half ($\frac{1}{2}$) inch beyond the face of each stone must be hammered off before laying, so as to leave the finished surface of the walls as smooth and true as practicable.

Filling of interstices.

Stones to be wetted.

Projections removed.

Bond in backing.

109. Proper attention shall also be given to bonding and constructing the rear of the walls in the best and most workmanlike manner. After the walls have been built as aforesaid, all joints on the inner or exposed faces thereof shall be properly raked out and cleaned to

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a depth of at least one-half (½) inch, and then neatly pointed and trimmed up in the best manner with the mortar specified above for pointing. Pointing.

110. **Cut-stone masonry and copings.**—The stones which are to be cut to specific dimensions for overflows, sills and wall copings, shall be sound, durable and of such quality as will be approved by the engineer. In general these stones will be from four (4) to eight (8) inches thick, of large size, with smoothly dressed or cut faces, ends and sides, and with beds adapted for laying on a bed of mortar not more than one-half (½) inch thick. In the joints the mortar shall not be more than three-eighths (⅜) inch thick at any point for the entire depth of the stone, and all spaces between said stones must be thoroughly filled out with mortar. If required, the mortar in the joints shall be driven into place with suitable caulking tools. In all face-work, the joints shall be raked out to a depth of at least one (1) inch, and then properly pointed with Portland cement mortar of the quality above specified. Quality. Thickness. Mortar joint. Pointing.

111. The stones must not be disfigured or injured in any manner in handling, and all additional cutting or dressing necessary to make them fit truly to the required lines and surfaces of the work shall be done by the contractor without extra compensation. Defacement. Adjustment.

112. **General, relating to masonry.**—The word "masonry" is understood to include all concrete-work, brick-work and stone-work; and the above specifications shall refer not only to the conduit, but also to all the other structures incidental to its construction. General definition.

113. Foundations for the masonry may be of rock, earth, piles, timber or plank, according to local conditions. The precise character of the foundation at any given point cannot be determined in advance, but will be decided upon by the engineer as occasion demands. For this reason also, the exact cross-section of the conduit at different points, and definite plans for the appertaining structures, cannot be submitted in advance, and all construction drawings exhibited at the time of letting shall be regarded only as approximate, both in dimensions, character of materials and relative location. As the work advances, definite drawings and directions will be furnished by the engineer, as aforesaid. Where required by the engineer, rubble masonry may at any time be Foundations. Character now indefinite. Plans subject to alteration.

Substitution of rubble masonry for concrete or brick work, and conversely.

substituted for brick masonry or for concrete, and *vice versa*, provided that ten days' notice of such change be given to the contractor in cases where the volume of work thus affected exceeds fifty cubic yards; but when any such change affects a smaller volume, no notice will be considered necessary. It is also understood that when said changes are made, the contractor shall have no claim for extra compensation on that account.

Materials to be clean.

446 114. All bricks and stones must be clean when being laid, and particular care shall be taken to prevent any earth or other foreign substance from dropping upon the masonry, or becoming incorporated therein, during the process of construction. Should any such substance accidentally fall upon any unfinished wall, the same shall be thoroughly removed before the masonry at that point is continued.

Centers, forms and bracing.

115. Strong centers and satisfactory moulds, forms and bracing shall be provided and maintained in good condition at the contractor's expense. They shall in all cases be carefully cleaned before using. The centers shall not be removed until the back-filling or embankment has been raised at least two feet above the top of the arch, unless otherwise directed by the engineer. At

Length of centering for conduit.

least 150 lin. ft. of straight centering for the upper arch of the conduit shall be used on each working section. These centers shall be constructed in

Manner of construction.

such manner that the rear ones may be removed and carried forward under those still in place, and be set up again in front as fast as the arch-work of the conduit is built.

Cleaning, pointing and applying cement wash.

116. On the completion of each working section of the conduit and the removal of the centering and braces, the entire interior surface of the lining masonry shall be carefully cleaned, pointed and smoothed, and if made of brick-work or concrete, shall then be washed over with neat Portland cement grout, applied with a brush in as thick a condition as practicable. The interior faces of the lining masonry in all structures pertaining to the conduit, below the contemplated highest level of the water therein, shall also be treated in a similar manner. The cost of the said cleaning, pointing and washing with neat cement must be included in the prices bid per cubic yard for the different classes of masonry.

Manholes in shafts.

117. The shafts are to contain masonry man-

holes, where they extend through earth or such soft rock as, in the opinion of the engineer, cannot safely be left without lining or support. Where the rock is solid, hard and durable in said shafts, arches with suitable abutments and skewbacks in such rock shall be built across the entire horizontal section, and the intersection of such arches with the manholes must be groined in the best and most workmanlike manner. Manholes shall also be constructed at such points as may be designated where the conduit is built in open trench. Wrought-iron steps, brackets for ladders, beams, bolts, etc., shall be built into the masonry or fastened to the rock in the strongest manner and wherever required. All work in connection with the shafts shall be done as will be directed by the engineer from time to time. The masonry in all such structures will be paid for at the price bid per cubic yard for the same, only the actual volume of masonry built above or outside of the exterior lines of the conduit being considered.

Arches in shafts.

Manholes for conduit.

Payment.

447 118. At such points as may be directed, suitable weepers shall be built in the side walls and floor of the conduit or tunnel, and in the masonry of shafts and manholes, but no deductions for such openings, when made in accordance with the engineer's directions, will be made.

Weepers.

119. All castings, pipes, bolts, rods, or other iron-work shown upon the plans, and such as may otherwise be required from time to time shall be built into the masonry, and secured thereto, in the best and most workmanlike manner wherever required, and in full accordance with the directions of the engineer. The cost of putting such iron-work in place must be included in the price bid per pound for furnishing said materials when the same are to be furnished by the contractor, or else in the price bid for the masonry where said materials are furnished by the executive board.

Iron-work built into masonry.

120. No water shall be allowed to stand upon, or flow over or against, any fresh masonry until the mortar has had ample time to set, as will be determined by the engineer; and all unfinished masonry shall be properly protected from injury by water or frost during inclement weather. No masonry of any description shall be laid in open excavations during the prevalence of frost, or in general between the fifteenth day of November

Masonry to be kept free from water and frost.

Suspension of work.

Precautions during frost.

and the first day of April, except by special permission of the engineer. If the work is carried on in cold weather, the necessary means for warming brick, stone, sand, cement and water shall be provided at the contractor's expense, and all requirements of the engineer to thoroughly protect the masonry, during and after laying, from damage by frost shall be promptly complied with. No work shall be done on masonry, backfilling or embankment while the weather is unfavorable for the purpose, in the engineer's opinion.

Masonry to be water-tight.

121. The masonry must in general be made water-tight at all points; and if, after the work is completed and tested, any leaks are discovered, the openings must be caulked or otherwise securely stopped.

Correction of defective work.

Any defects in the work, from any cause on the contractor's part, or discovered at any time, shall immediately be corrected at the contractor's expense, even if it be necessary to take down and entirely rebuild portions of it.

Searching for defective work.

Furthermore, the engineer shall have the right to open the masonry lining of both the tunnel and the conduit formed in open trench, at any time after the removal of the centering and at any points he may select, for the purpose of ascertaining whether said backing and filling has been performed properly; and wherever any defects in the work may thus be found, the same shall at once be remedied at the contractor's expense by

Injecting grout into defective masonry.

injecting cement grout under pressure from a suitable pump into any cavities, or by taking down and properly rebuilding the work in accordance with these specifications, or by such

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other means as may be approved by the engineer. In case cement grout is used, as aforesaid, the same shall be prepared by mixing not more than one (1) part of sand with one (1) similar part of cement. The inspection of workmanship and materials furnished by the contractor, and their acceptance by agents of the executive board, shall not relieve the contractor from any responsibility or obligation in the proper performance of the work.

Measurement.

122. The quantity of masonry to be paid for will be determined by measurements or estimates of the number of cubic yards actually built, in conformity with the aforesaid diagrams, limitations and conditions and the plans and directions of the engineer, no allowance for angles or corners being made in any case, and all open-

ings, except grooves or rabbets, being deducted. No other constructive or conventional measurement of the volume of any kind or class of masonry will be allowed.

Interference with water-courses, etc.

123. **Pipes, culverts, and water-courses.**— Wherever it may be necessary to cross, alter, divert, or interfere with any existing pipes or culverts and natural or artificial water-courses, the work shall in general be done according to the directions of the engineer; but in all cases the contractor shall make, at his own expense, ample and secure provisions for temporarily carrying the water across or along the conduit work, or for diverting the flow into other proper channels. Any damage by rain or floods or resulting from a failure on the contractor's part to make such provisions, must be borne by him alone.

Resulting damages.

Restoration of pipes, ditches, etc.

124. On the completion of the conduit in any locality where the original surface of the ground is not to be permanently altered, and where such pipes, culverts, ditches, or water-courses of any kind exist and are to be carried over the conduit, the same shall promptly be replaced and restored at the contractor's expense in the best and most workmanlike manner, to the full satisfaction of the engineer. Any additional masonry that may be required over the conduit for the support of such pipes or for forming a channel for a water-course, will be paid for at the prices bid per cubic yard for the same quality of conduit masonry constructed in open excavations when built in accordance with the plans and directions of the engineer.

Supporting masonry for pipes, etc.

Excavation for permanent new channels.

125. In localities where permanent new channels for water-courses of any description are required to be made and carried over the conduit, any excavation ordered by the engineer for the formation of such channels will be paid for at the same prices as are bid per cubic yard for roadway grading, as aforesaid.

Pipes and culverts under conduit.

126. Wherever any pipe, culvert, or water-course of any kind is to be permanently carried under the conduit, special plans and directions for such work will be given by the engineer, and the contractor shall furnish and put in place all necessary materials for the purpose. Pay-

Manner of payment.

449 ment for the various items of work thus performed will be made at the same rates and under the conditions as herein specified for the construction of the conduit in open excavation, it being understood that the engineer shall have the right to designate from time

Cast-iron culvert pipes.

Vitrified earthenware culvert pipes.

Manner of laying.

Quality of pipes.

Payment.

to time the quality and dimensions of the materials to be used, as well as the mode of construction. When cast-iron pipes are used for culverts they shall be put together with properly made and caulked hot-lead joints, the depth of such lead in the socket being not less than two (2) inches in any case; and when vitrified earthenware pipes are thus used, the socket joints shall be completely filled with Portland cement pointing mortar, as elsewhere herein specified. Both kinds of pipe shall be laid true to line and grade, as directed by the engineer, in the best manner, and all pipes must be of the best quality and perfectly sound in every respect after being laid in place. The vitrified earthenware pipe used shall be of the heaviest and thickest kind, and the cast-iron pipe shall be of the standard weight and thickness commonly used for water-works purposes. The prices bid for furnishing and laying such pipes must be per lineal foot, complete.

Back-filling or embankment.

Time for completing embankments.

127. Special care must be taken in the back-filling or embankment around such pipes or other culverts to use only selected earth material, and to compact the same thoroughly by pounding or ramming and puddling as the engineer will direct. The cost of this work must be included in the prices bid for excavation. All culverts and embankments shall be fully completed at least one month before the construction of the conduit over the same, and if required by the engineer, all such embankments shall previously be thoroughly wetted and allowed to settle at the contractor's expense.

Back-filling conduit trench.

Pounding.

*Distribution of material.

128. **Back-filling in open excavations.**—After the completion of the conduit masonry in open excavations, the trench shall be back-filled with the best of the excavated earth material, and in such manner from time to time as the engineer may direct. The earth used for this purpose must be carefully selected and free from large and hard lumps, stones and large pebbles, until a depth of refilling of at least one (1) foot above the top or crown of the masonry arch has been attained. It shall be spread in layers not exceeding six (6) inches in thickness, each of which shall be thoroughly compacted and adjusted to the sides of the trench by ramming or pounding while in a moist condition, and in case said material is too dry to admit of such consolidation, it shall be thoroughly moistened by sprinkling. The ma-

terial must not be thrown down from above faster than the workmen below can properly distribute and compact it, nor shall it be drenched with water so as to render it of the consistency of mud. This portion of the work shall be done while the arch is still securely supported upon its centering, and it shall be brought up evenly on both sides of the conduit so that no unbalanced pressures will be thrown upon the masonry.

Centering to remain.

129. In completing the refilling of the trench upwards from the aforesaid level, the material shall be deposited in even layers not exceeding nine (9) inches in thickness, each of which shall be well pounded. This refilling may be done with earth or finely broken fragments of rock, until a depth of covering of at least three and one-half ($3\frac{1}{2}$) feet above the crown of the arch has been reached. Above this level, coarser material may be used, but in no case shall large lumps of hard or frozen earth, boulders, etc., be thrown into the trench.

Filling upper part of trench.

130. Where plank sheeting has been used to support the sides of the open excavation, the same shall be left in place below the level of the top of the arch backing, if so directed by the engineer, and compensation therefor will be allowed up to said height, and for a thickness of not more than two (2) inches, at the rate of fourteen (14) dollars per thousand feet B. M.; but above this level, the sheeting and bracing shall be carefully removed in such manner as to prevent the caving in of the sides. While the sheeting planks are being withdrawn, the vacancies left by them shall be thoroughly filled by ramming in fine material with tools specially adapted to the purpose. In places, however, where the engineer is of the opinion that the sheeting and bracing above said level cannot be removed without injury to the work, he will give written directions that it shall be left in place, and the contractor will be paid for the lumber thus left, up to a thickness of two (2) inches, at the rate of fourteen (14) dollars per thousand feet B. M., as above.

Sheeting left in place.

Payment.

Removal of sheeting.

131. The open excavations behind the walls of the gate-house and overflow chambers, shafts, manholes, culverts, and other structures pertaining to the conduit, shall be back-filled with similar selected material and in the same general manner as above specified for the conduit trench, the intention being to have all spaces behind said walls

Back-filling for walls of structures.

compactly filled out with a relatively impervious earth, and without causing any injury to the masonry.

132. The cost of all the aforesaid labor of refilling, and the necessary hauling therefor, must be included in the prices bid per cubic yard for excavation, except when the average haul is over 1,000 feet, in which case the additional price bid per cubic yard for such extra haul, as aforesaid, will be paid.

Filling cavities behind planking.

133. **Back-filling in tunnel and shafts.**—In the tunnel and shafts, all spaces or cavities behind any planking or timbering of the roof or sides of the excavation must be compactly filled by ramming in suitable dry material with tools specially adapted to the purpose.

Filling space behind lining masonry.

451 134. The spaces between the exterior surface of the brick or other lining masonry, and the rock or other material of any tunnel excavation, or any timbering or supports for the roof or sides of such tunnel which it may be necessary to leave in place, shall be solidly filled as follows:

Concrete or rubble filling.

From the bottom of the excavation up to a level of thirty-three (33) inches above the center or middle of the conduit, all of said spaces shall be compactly filled with concrete or rubble masonry, which will not be regarded as any portion of the lining masonry, while the remainder of said spaces, above said level and outside of the arched roof, shall be filled with dry material consisting of

Dry filling material.

tunnel refuse, gravel, or other material approved by the engineer, as indicated in the appended

Consolidation of filling.

diagrams No. 9, 10, 11, 13 and 14. Both the concrete and the dry filling material must be thoroughly compacted by ramming or pounding with suitable tools into a solid mass.

Payment for masonry filling.

135. The cost of all such dry filling in tunnel-work must be included in the prices bid per cubic yard for excavation in tunnel, as aforesaid. For the said concrete or rubble masonry filling, payment will be made at the prices bid per cubic yard therefor, on the basis that downwards from said level of thirty-three (33) inches above the center or middle of the conduit, the volume contained between the exterior surface of the required lining masonry, and the above-described lines defining the limits of estimated excavation, as

Diagrams exhibiting limits.

exhibited in said diagrams No. 9, 10, 11, 13 and 14, respectively, has been properly filled with such material as aforesaid. All spaces outside of said limits shall be filled in the manner and with the

materials above described at the contractor's expense.

Refilling of shafts.

136. The shafts shall be refilled over or around the masonry constructed therein, with earth material of approved quality from the excavations, such material to be carefully lowered to place in suitable buckets where the depth is more than fifteen (15) feet. Said filling shall be made as the masonry is being carried up, and be thoroughly compacted by ramming in layers of not over six (6) inches in thickness for the entire height; and when the material is too dry to admit of thorough consolidation, it shall be suitably moistened as aforesaid. The cost of all such refilling of the shafts must be included in the prices bid per cubic yard for the excavation of shafts.

Precautions in back-filling.

137. Special care shall be taken in the back-filling of the tunnel and shaft masonry, as well as in the back-filling of the conduit in open cuttings, to insure thorough filling of all cavities without causing any deformation of the lining masonry, and all defects which may be discovered at any time after the removal of the centering shall promptly be remedied by the contractor, or by the engineer at the contractor's expense.

Removal of surplus material.

452 138. **Surplus excavated material.**—All of the excavated material, from whatever source, which is not required for the back-filling over and along the conduit and its appurtenances in any locality, shall be promptly removed and deposited at such places as the engineer may direct. The embankments thus made shall conform closely to the dimensions and grades given by said engineer, and the surfaces must at all times be kept properly graded. A portion of said material will be used for filling low lands owned or leased by the city along the shore of the lake and extending out into shallow water; and if required, the whole of said material shall be deposited upon such land.

Filling at shore of lake.

139. The cost of removing all such surplus material and making said embankments must be included in the prices bid per cubic yard for excavation, except when said material must be hauled an average distance of more than 1,000 feet, in which case the additional price bid per cubic yard for such extra haul, as aforesaid, will be paid.

Removal of rubbish and tools, etc.

140. **Clearing.**—As the work progresses, all rubbish, refuse, unused materials, tools and appliances shall be removed promptly from the

ground at the contractor's expense. Whenever this clearing of such matter, and the repair of public and private roads, fences or other damages, done by the contractor in the construction of the conduit and its appurtenances, are neglected, the engineer will give notice to that effect to the contractor; and if said matter be not removed or the required repairs be not made within five days thereafter, or such other time as the engineer may direct, or if the contractor does not at once take the necessary precautions to insure safety of travel, the engineer may employ other parties to do such work, and the expense thus incurred shall be deducted from any moneys due, or that may become due, to the contractor.

Must be done promptly.

Slope walls and paving, where used.

141. **Slope walls and paving.**—Dry rubble-stone masonry and paving are to be laid without mortar, and may be used for the side slopes and bottom of water-courses which are carried over the conduit, for the bottom and approaches of culverts under said conduit, for the channels connected with overflows or waste-weirs, and for protecting embankments or earth slopes at such other places as the engineer may designate. This class of work shall be done with stone of suitable size and quality, laid closely by hand with as few spalls as practicable, and in such manner as to present a smooth and true surface conforming to the plans and directions. Joints must be broken as much as possible, and care shall be taken to secure the greatest amount of bond and strength. When laid against or upon any earth surface, the same shall in all cases be thoroughly consolidated, and the stones must be well bedded and pounded into the earth so as to leave no vacancies. Where paving is required to be laid upon a bed or layer of gravel, the same shall be put in place as directed.

Manner of laying.

Gravel under paving.

Size of stones.

453 142. For laying in walls, the stones must be flat, of good size, and conforming in general to the requirements for rubble masonry laid in mortar. For paving, the stones shall be set on edge, and have dimensions not less than eight (8) inches deep, ten (10) inches long and three (3) inches thick; or if cobblestones are to be used for this purpose, they must be set with their longest diameter at right angles to the bed or foundation, and such diameter must be not less than eight (8) inches in any case. The depth and size of the paving stones will vary according to circumstances, as the engineer will direct. Payment

Payment.

will be made for all such work at the prices bid per cubic yard therefor.

Riprap, where used.

143. **Riprap.**—When required by the engineer, the contractor shall protect the face of embankments or the foot of slopes from the action of running water by a facing of riprap stone, or of brush and stones, or by a retaining wall, as may be directed. The stones for riprap work will consist of rough, angular pieces, of large size, or angular boulders, containing at least two-thirds of a cubic foot, laid by hand upon the said slope by experienced workmen so as to form a layer of uniform thickness, with the largest stones on the face and as well wedged together and interlocked by other stones as possible. All large interstices in the mass and next to the earth bank must be filled with suitable small stones. Round boulders shall not be used in the work. The extent and thickness of the layer of riprap will be determined by the engineer.

Size of stones.

Manner of laying.

Laying brush and stone.

144. Where proper large and angular stones for riprap work are not readily available, the required bank protection may be made by courses of green brush, laid with the stems at right angles to the line of the bank and butts outward, alternating with courses of the largest available field stones, all the interstices being filled with small stones of any kind. The brush must be cut to the required length and be properly arranged in layers of uniform thickness, and the most suitable stones shall be placed on the outside of the work near the butts, care being taken to fill all spaces with coarse gravel or small stones, and to use an abundance of heavy stones in the interior of the mass to hold down the branches of the stems. The proper dimensions for all such work will be determined from time to time by the engineer, and payment therefor will be made at the prices bid per cubic yard, measured or estimated in place.

Payment.

Wrought-iron work.

145. **Iron-work.**—Wrought iron will be used for bolts, pins, manhole steps, ladders, guides, beams, brackets, etc., and must be of the best quality of American refined iron, tough, ductile, and having a tensile strength of not less than 50,000 pounds per square inch, with an elastic limit of at least 25,000 pounds per square inch.

Quality.

Cast-iron work.

146. Cast iron will be used for beams, braces, stop-plank grooves, channels, weir plates, guides, manhole curbings and covers, rectangular or circular pipes or water passages, platforms, etc., and shall be made from the

Quality.

best quality of tough, grey metal, without admixture of cinder iron or other inferior grades of iron, and treated in such manner as to produce castings which shall be strong, tough, sound and even in grain, free from uncombined carbon when examined under the microscope, and soft enough to satisfactorily bear drilling, chipping and cutting. Specimen rods of the metal used, each being twenty-six (26) inches long, two (2) inches wide, and one (1) inch thick, shall be made without charge as often as the engineer may direct, and shall be tested, at the contractor's expense, both for transverse strength and deflection, by placing them horizontally and flatwise upon supports twenty-four (24) inches apart, and then applying a steadily increasing load at the middle of each bar. The quality of the metal used must be such that said bars shall each carry a center load of not less than two thousand (2,000) pounds before breaking, and exhibit a deflection of not less than three-eighths ($\frac{3}{8}$) of an inch. In estimating the suitability of the metal from said tests, the average of the three highest results obtained from each set of four bars will be considered as representing the actual strength of the iron.

Test specimens.

Test load.

Furnishing test-bars.

147. At least one set of four test-bars shall be made and tested as described, on each working day during the manufacture of the large pieces. These test-bars must be poured from the ladle either before or after any particular castings are poured, and must present true samples of the iron used in said castings; they shall be cast from regular patterns in green sand, and as nearly as possible to the required dimensions without being finished up; proper corrections will, however, be made in the results for slight variations of width and thickness. Records shall be kept of the tests of all bars made, and a duly certified copy of such records shall be forwarded to the engineer.

Records of tests.

Quality of castings.

148. The castings shall be free from scoria, sand holes, air bubbles and other defects or imperfections, and must conform in weight and thickness to the drawings and directions to be furnished by the engineer. No allowance will be made for making or altering any patterns required for said castings, and the cost of all such work must be included in the price bid per pound for the finished piece. None of the castings shall be stripped while still showing any color of heat, but shall be

Pattern-making.

left in the flasks for a sufficient length of time to prevent unequal cooling and contraction by subsequent exposure. On being removed from the flasks, they shall be subjected to a careful examination and hammer test for the purpose of detecting imperfections of any kind. They shall then be thoroughly dressed and made clear and free from earth, sand or dust, which adheres to the iron in the moulds; iron-wire brushes must be used, as well as softer brushes to remove the loose dust. No acid shall be used in cleaning the castings. No lump or rough places shall be left on any surface and no plugging or filling will be allowed. After being properly dressed and cleaned, they shall again be subjected to a thorough inspection and hammer test. The contractor will be required at the foundry to place all castings in such positions as may be deemed necessary for convenience of inspection, and the engineer may reject, without proving, any casting which is not in conformity with the specifications or the drawings furnished.

Treatment of castings.

Cleaning of castings.

Inspection and testing of castings.

149. After its inspection and while free from rust, moisture, dirt, dust, sand or other improper matter, all of the wrought and cast iron work shall be thoroughly coated, by dipping or brushing, with at least two good coats of asphalt paint, of such quality as the engineer will direct. This coating shall be applied at the places of manufacture of said work, and in case that it has become defective or worn off in transportation or otherwise, it shall be carefully renewed before the metal is imbedded or built into any masonry. All of the iron-work which is left exposed in any structure, shall also be thoroughly cleaned and freed from mortar, dirt or other debris of construction, and thickly recoated with said paint on the completion of the work at any locality.

Painting or coating of iron-work.

Renewal of coating and cleaning.

150. The iron-work of every description must conform closely to the required dimensions and be set in place in the best and most workmanlike manner. Payment for all such material furnished by the contractor will be made at the prices bid per pound for the finished work in place, said prices to include all necessary machine-work, pattern-making, testing, fitting, painting, transportation and labor, and with no allowance for loss or waste.

Conditions.

Payment.

151. **General relating to materials and workmen.**—All materials and workmanship furnished by the contractor shall be of the first

Quality.

Inspection.

Rejected material.

Responsibility for improper work.

quality of their kind. The same will be subject to rigid inspection and must be entirely satisfactory to the engineer. Any material that has been rejected or condemned, shall immediately be removed from the site of the works, failing which such material may be conspicuously marked as rejected, with paint or otherwise, by the engineer or inspector, and removed at the contractor's expense. The presence of any engineer or inspector at the time that any improper material is being put in place, or improper workmanship is being performed, shall in no way be presumed to release, in any degree, the responsibility of the contractor or his obligations.

Skilled workmen.

Improper workmen.

Superintendents and foremen.

152. The contractor further agrees that he will employ only competent and skilled workmen to do the work, and that whenever said chief engineer shall inform said contractor in writing that any person on the work, is, in his opinion, incompetent and unfaithful, quarrelsome or disorderly, such person shall be discharged by said con-
456 tractor and shall not be again employed on said work. A sufficient number of experienced superintendents or foremen must also be employed to represent the contractor at different parts of the work, and they shall receive and obey directions or orders from the engineer.

Storage of explosives.

153. When explosives are introduced into the locality of the conduit, the contractor must provide suitably isolated and safe storage places therefor, and only skillful and trustworthy workmen shall be employed in the handling and use thereof, or have access thereto. Caps and other exploders shall not be stored in the same place in which dynamite or other explosives are stored.

Intoxicating liquors.

Orderly conduct.

154. The contractor will not be permitted, either by himself or by any of his agents or employees, to give or sell any ardent or intoxicating liquors or spirits to his workmen, or any other persons, at or near the line of the conduit, nor allow any such spirits to be brought on the works by said employees or other persons; and he will be required, at all times, to exercise his whole power and influence to discountenance and prevent the use of such spirits in any way by persons in his employ or under his control. He shall also exercise his influence and authority to the utmost extent to maintain at all times an orderly conduct among said employees, and shall spare no effort or expense in promptly quelling any disturbance,

quarrel or riot that may break out among them, or between the same and any other persons.

Materials to be kept free from pollution.

155. The contractor shall at all times exercise the utmost vigilance to prevent any of the bricks, stones and other materials used in the work from being soiled or polluted by excrements or other offensive matter, also to prevent the deposit of any excrements or offal of any character anywhere within the conduit and its appurtenances. As one safeguard against such pollution, he shall provide and properly maintain, under the direction of the engineer, all appliances and receptacles for said excrements and offal that may be necessary on any part of the work; and where any part of the conduit and its appurtenances may have become soiled by such matter, accidentally or otherwise, such place shall at once be thoroughly cleaned and disinfected as the engineer will direct, failing which the engineer will cause said cleaning and disinfection to be done by other parties at the contractor's expense, and will deduct the costs thus incurred from any moneys due to said contractor on account of the work. Any employee of the contractor who shall be known to commit a nuisance in said conduit and its appurtenances, or to pollute any material used in the construction thereof, shall immediately be discharged.

Disinfection of polluted materials.

Observation of local ordinances.

156. In every operation connected with the work herein specified, all general or local ordinances and laws, controlling or limiting
457 in any way the action of the contractor or his employees engaged on said work, or affecting the materials applied or used in the construction thereof, must be respected and strictly observed.

FURTHER AGREEMENTS.

157. **Commencement and termination of work.**—Said contractor shall begin work within ten (10) days after the execution and delivery of this contract, and he shall progress therewith so that the whole shall be completed on or before the day of , 189 .

158. **Prices and payments.**—Said city hereby agrees to pay, and said contractor hereby agrees to receive, the following prices in full compensation for furnishing all materials, not specifically excepted, which may be required in the aforesaid work, and for the delivery of the same; also, for furnishing all labor required in the execution of all the work contemplated in this contract; also, for furnishing all necessary and proper machinery, tools,

appliances, power, etc.; also, for all loss or damage arising out of the nature of the work aforesaid, or from the action of the elements, or from any unforeseen obstructions or difficulties which may be encountered in the prosecution of the same; also, for all risks of every description connected with the work; also, for all expenses and damages incurred by or in consequence of the suspension or discontinuance of said work, as hereinafter specified; and for well and faithfully completing the same and the whole thereof, in the manner and according to the plans and specifications, and the requirements of the engineer under them, to wit: The construction of a masonry water conduit, tunnel, gate-house, overflow chambers, and the appurtenances thereto, commencing at the northeastern corner of Hemlock lake, Livingston county, N. Y., and terminating at a point on the outlet of said lake about 12,000 feet northerly:

PRICES.

a. For all **pumping, bailing and draining** in open excavations and in the shafts and tunnel, for the entire work, including furnishing and maintaining all necessary appliances and labor, the gross sum of..... ..... dollars ($.....)

b. For all **grubbing and clearing,** including all incidental work, the sum of.....($.....) per acre of surface actually cleared.

c. For all **earth excavation in roadway grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **permanent new channels for water-courses** carried **over** the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, and all incidental work, the sum of..... ..... ($.....) per cubic yard.

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d. For all **rock excavation in roadway grading** where the existing conformation of the surface is to be permanently altered by excavations or embankments, and in the construction of **permanent new channels for water-courses** carried **over** the conduit, including haul of 1,000 feet or less, making embankments and other final disposal of the excavated material, and all incidental work, the sum of..... .....($.....) per cubic yard.

e. For all **earth excavation in open trenches or pits,** for the conduit, gate-house, overflow chambers and culverts carried under the conduit, including bracing and sheeting, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of..... ....($.....) per cubic yard

f. For all **rock excavation in open trenches or pits,** for the conduit, gate-house, overflow chambers and culverts carried under the conduit, including bracing and shoring, back-filling of trenches and masonry, making embankments and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of..... .....(\$.....) per cubic yard.

g. For all **earth excavation in shafts** for tunnel, including all necessary bracing, timbering, back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of..... .....(\$.....) per cubic yard.

h. For all **rock excavation in shafts** for tunnel, including all necessary bracing, timbering, back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of..... .....(\$.....) per cubic yard.

i. For all **earth excavation in tunnel,** including all necessary bracing, timbering, lighting, ventilating, removal and back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of..... .....(\$.....) per cubic yard.

459 *j.* For all **rock excavation in tunnel,** including all necessary bracing, timbering, lighting, ventilating, removal and back-filling and other final disposal of the excavated material with haul of 1,000 feet or less, and all incidental work, the sum of..... .....(\$.....) per cubic yard.

k. For **hauling more than 1,000 feet** any excavated material from sides of open excavations, or from ends of tunnel or tops of shafts, including making and grading of embankments and spoil banks, and all incidental work, the sum of..... (\$.....) per cubic yard, measured in excavation, for each additional one hundred feet hauled, or fraction thereof greater than fifty feet.

l. For all **concrete masonry** mixed in the proportion of one part **natural cement,** two parts sand and five parts ballast, deposited and rammed in place in foundations, backing and walls of the gate-house, overflow chambers, culverts and other structures, and in the foundations, sides and top of the conduit, built **in open excavation,** including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of..... .....(\$.....) per cubic yard.

m. For all **concrete masonry** mixed in the proportion of one part **Portland cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations, backing and walls of the gate-house, overflow chambers,

culverts, and other structures, and in the foundations, sides and top of the conduit, built **in open excavation,** including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of..... ....(§..... ..) per cubic yard.

n. For all **concrete masonry** mixed in the proportion of one part **natural cement,** two parts sand and five parts ballast, deposited and rammed in place in foundations and backing of lining masonry built **in the tunnel and shafts,** including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of .. ..(§ ....) per cubic yard.

o. For all **concrete masonry** mixed in the proportion of one part **Portland cement,** three parts sand and seven parts ballast, deposited and rammed in place in foundations and
460 backing of lining masonry built **in the tunnel and shafts,** including furnishing, placing and removing all forms and moulds, and all incidental work, the sum of ... .(§.....) per cubic yard.

p. For all **brick masonry laid with natural cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in foundation walls of gate-house and overflow chambers,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, cleaning, pointing, applying cement wash, and all incidental work, the sum of..... ....(§.....) per cubic yard.

q. For all **brick masonry laid with Portland cement** mortar, mixed in the proportion of two parts sand to one part cement, **in foundation walls of gate-house and overflow chambers,** including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, cleaning, pointing, applying cement wash, and all incidental work, the sum of..... .. .. (§... .....) per cubic yard.

r. For all **brick masonry laid with natural cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in the conduit, manholes, culverts and minor structures,** built in open excavation, including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of..... .....(§.....) per cubic yard.

s. For all **brick masonry laid with Portland cement** mortar mixed in the proportion of two parts sand to one part cement, **in the conduit, manholes, culverts and minor structures,** built in open excavation, including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning,

pointing, applying cement wash, and all incidental work, the sum of .....
.....($.....) per cubic yard.

t. For all **brick masonry laid with natural cement** mortar, mixed in the proportion of one and one-half parts sand to one part cement, **in the tunnel and shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of..... .....
.....($..... ..) per cubic yard.

461 *u.* For all **brick masonry laid with Portland cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the tunnel and shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, applying cement wash, and all incidental work, the sum of..... ....($... .....) per cubic yard.

v. For all **rubble masonry laid with natural cement** mortar, mixed in the proportion of two parts sand to one part cement, **in foundation, backing and walls of the gate-house and overflow chambers,** built in open excavation, including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, and all incidental work, the sum of.....
.....($.....) per cubic yard.

w. For all **rubble masonry laid with Portland cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, **in foundation, backing and walls of the gate-house and overflow chambers,** built in open excavation, including furnishing, placing and removing staging, centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, and all incidental work, the sum of.....
....($.....) per cubic yard.

x. For all **rubble masonry laid with natural cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the conduit, manholes, culverts and minor structures,** built in open excavations, including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, and all incidental work, the sum of.....
....($.....) per cubic yard.

y. For all **rubble masonry laid with Portland cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, **in the conduit, manholes, culverts and minor structures,** built in open excavations, including furnishing, placing and removing centering moulds and forms, setting all required iron-work, plastering, cleaning, pointing, and all incidental work, the

sum of.....
.....($.....) per cubic yard.

z. For all **rubble masonry laid with natural cement** mortar, mixed in the proportion of two parts sand to one part cement, **in the tunnel and shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, and all incidental work, the sum of .....
462 .....($.....) per cubic yard.

aa. For all **rubble masonry laid with Portland cement** mortar, mixed in the proportion of two and one-half parts sand to one part cement, **in the tunnel and shafts,** including furnishing, placing and removing centering, moulds and forms, setting all required iron-work, plastering, cleaning, pointing, and all incidental work, the sum of.....
.....($.....) per cubic yard.

bb. For all **cut-stone masonry and copings** laid in Portland cement mortar, mixed in the proportion of two and one-half parts sand to one part cement, in gate-house, overflow chambers, shafts and other structures, including cleaning, pointing, and all incidental work, the sum of.....
.....($.....) per cubic yard.

cc. For all **screened gravel** deposited in foundations of conduit, gate-house, overflow chambers, culverts and other structures, built in open excavations, including ramming in place, and all incidental work, the sum of.....
.....($.....) per cubic yard.

dd. For all **broken stone** deposited in foundations of conduit, gate-house, overflow chambers, culverts and other structures, built in open excavations, including ramming in place, and all incidental work, the sum of.....
.....($.....) per cubic yard.

ee. For all **slope wall** laid dry for protecting the sides of earthen embankments, excavations, and channels of water-courses, including all incidental work, the sum of.....
.....($.....) per cubic yard.

ff. For all **stone paving** laid for protecting the sides of earthen embankments and excavations, the channels of water-courses, and the bottoms of culverts, including all incidental work, the sum of.....
.....($.....) per cubic yard.

gg. For all **riprap** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of.....
.....($.....) per cubic yard.

463 *hh.* For all **brush and stone** put in place for protecting the sides of earthen embankments, excavations and channels of water-courses, including all incidental work, the sum of .....
.....($.....) per cubic yard.

ii. For all **24-inch cast-iron water pipe** for culverts, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of..... .....($.....) per lineal foot.

jj. For all **20-inch cast-iron water pipe** for culverts, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of ....($..... ...) per lineal foot.

kk. For all **16-inch cast-iron water pipe** for culverts, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of..... ... ...($..... ..) per lineal foot.

ll. For all **12-inch cast-iron water pipe** for culverts, furnished and laid with hot-lead joints, complete in every respect, including all incidental work, the sum of ....($.....) per lineal foot.

mm. For all **20-inch vitrified earthenware pipe** for culverts, furnished and laid with Portland cement joints, complete in every respect, including all incidental work, the sum of .....($.....) per lineal foot.

nn. For all **18-inch vitrified earthenware pipe** for culverts, furnished and laid with Portland cement joints, complete in every respect, including all incidental work, the sum of ....($..... ..) per lineal foot.

oo. For all **15-inch vitrified earthenware pipe** for culverts, furnished and laid with Portland cement joints, complete in every respect, including all incidental work, the sum of ....($.....) per lineal foot.

464 *pp.* For all **12-inch vitrified earthenware pipe** for culverts, furnished and laid with Portland cement joints, complete in every respect, including all incidental work, the sum of..... ....($.... .....) per lineal foot.

qq. For all **8-inch heavy wrought-iron well tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of..... ....($.....) per lineal foot.

rr. For all **7-inch heavy wrought-iron well tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of..... ... ...($.....) per lineal foot.

ss. For all **6-inch heavy wrought-iron well tubing** for tunnel ventilation, including driving through intervening earth strata to ledge rock, and all incidental work, the sum of.. .. ..($.....) per lineal foot.

tt. For all **tunnel ventilation holes 8 inches in diameter,** drilled through ledge rock from the bottom of the eight-inch tubing to the top of the tunnel, including all inci-

dental work, the sum of..... ....($... .....) per lineal foot.

uu. For all **tunnel ventilation holes 7 inches in diameter,** drilled through ledge rock, from the bottom of the seven-inch tubing to the top of the tunnel, including all incidental work, the sum of..... ....($.....) per lineal foot.

vv. For all **tunnel ventilation holes 6 inches in diameter,** drilled through ledge rock, from the bottom of the six-inch tubing to the top of the tunnel, including all incidental work, the sum of..... ....($... .....) per lineal foot.

ww. For all **timber piles** furnished, driven and left in place in foundations of conduit, gate-house, overflow chambers and other structures built in open excavations, including all incidental work, the sum of..... ....($.....) per lineal foot.

465 *xx.* For all **timber and plank** furnished and put in place in foundations of conduit, gate-house, overflow chambers, culverts and other structures built in open excavations, including all incidental work, the sum of.... ....($.....) per thousand feet, B. M.

yy. For all **wrought-iron work,** such as bolts, beams, channels, guides, steps, spikes, nails, etc., furnished and set in place wherever required in any masonry or foundation, including coating and all incidental work, the sum of... ....($.....) per pound.

zz. For all **cast-iron work,** such as beams, braces, channels, guides, washers, sluiceways, weirs, manhole curbs and covers, etc., furnished and set in place wherever required in any masonry or foundation, including coating and all incidental work, the sum of..... ....($.....) per pound.

TIME FOR COMPLETION OF WORK.

aaa. **Least number of consecutive days** after execution of contract required to complete the whole work..... ....(..... ...)

159. **Monthly estimates.**—In order to enable said contractor to prosecute the work advantageously, it is hereby mutually agreed that said engineer shall, on or about the last day of each month in which any work has been done, make an estimate in writing of the amount of work done, and the value thereof according to the terms of this contract. Each estimate shall be of the entire amount or quantity and value of the work done since said contractor commenced the performance of this contract on his part. From the amount of each estimate, except the final one, so made by said engineer, there shall be deducted ten (10) per cent., to be retained until the final completion and acceptance of all the work

by said board, and the balance, less the total amount of all previous payments, also less such sum or sums as may be otherwise retained as herein provided, shall be paid to said contractor by cash orders issued by said board on the treasurer of said city, on or about the 15th day of the month succeeding the month for which the estimate is made. Such estimates shall not be required to be made by strict measurements or with exactness, but they may, at the option of the engineer, be approximated only, and said engineer shall not be required to estimate the exact full amount and value of such work done.

466 160. **Estimates not conclusive.**—It is expressly agreed and understood by and between the parties hereto that neither said city, nor said board, shall be precluded or estopped by any estimate made by said engineer from, at any time, showing the true and correct amount, character or value of the work which shall have been done, and materials which shall have been furnished by said contractor, or any other person or persons, firm or corporation, under this contract.

161. **Estimates in case of disputes.**—In case any differences or disputes shall arise under this contract, relating to said work and materials, the decision of said chief engineer, when approved by said board, shall be a condition precedent to the right of said contractor to such estimate, and to receive any moneys under this contract.

162. **Estimates not an acceptance of work.**—No payments or estimates shall be considered as an acceptance of the work done or materials furnished, or as a release of said contractor from any responsibility connected therewith, and no partial payments or estimates shall be considered as controlling said engineer in making the final estimate, hereinafter mentioned.

163. **Payments.**—Said contractor further agrees not to demand, or to be entitled to receive, payment for any work or materials done or furnished under this contract except in the manner herein set forth; nor unless each and every one of the terms, covenants, and agreements herein contained to be performed, kept, observed and fulfilled on his part, have been performed, kept, observed, and fulfilled, and said chief engineer shall have given his certificate to that effect and said board shall have approved of such estimate.

164. **Reserve for repairs.**—It is further understood and agreed that said board may retain for the period of one year out of the moneys payable to said contractor under the final estimate hereinafter referred to, the sum of two (2) per cent. of the total value of the work done under this contract, as exhibited by said final estimate, and to deposit the same at interest in some savings bank or banks in said city. Said contractor shall designate the bank or banks in said city in which such deposit shall be made upon written request of said board, and upon his failure so to do within ten days after such request has been made, said board may deposit said moneys in such bank or banks as it may select, and such deposit, whether made at the request of said contractor or in the discretion of said board, it is mutually agreed shall be at the

sole risk and loss of said contractor; and said board may draw upon and expend the same in the manner hereinafter provided for in making such repairs on the line of said work as said engineer may deem necessary and expedient, and said board agrees upon the expiration of one year, as hereinafter provided for making
467 repairs to said work, if the whole of said work shall at that time be in good order, to pay to said contractor the whole, or such part of the sum retained as aforesaid, together with the accrued interest thereon, as may remain after the expense of making said repairs shall have been paid therefrom.

165. **Final estimate.**—Whenever in the opinion of said chief engineer said contractor shall have completely performed this contract, said chief engineer shall prepare a final estimate and certify the same to said board, in which final estimate he shall state, from actual measurements, the whole amount of work done by said contractor, and also the value of such work under and according to the terms of this contract. On the expiration of sixty (60) days after the acceptance by said board of the work herein agreed to be done by said contractor, said city will pay said contractor by a cash order issued on the treasurer of said city, the amount remaining after deducting from the amount or value contained and stated in said final estimate, all such sums as shall theretofore have been paid to said contractor under any of the provisions of this contract, and also deducting all such sum or sums of money as by the terms hereof it is or may be authorized to reserve or retain: Provided that nothing herein contained shall be construed to affect the right of said board, hereby reserved, to reject the whole or any portion of the aforesaid work, should said final estimate be found, or known, to be inconsistent with the terms of this contract, or otherwise improperly given.

166. **Damages for failure to complete within time limited.**—In case said contractor shall fail to fully and entirely, and in conformity with the covenants, terms and agreements of this contract, perform and complete said work, and each and every part and appurtenance thereof, within the time hereinbefore limited for such performance and completion, or, within such further time as may be allowed by said board for such performance and completion, said chief engineer shall appraise the value of the direct and computable damages caused to said city by such failure, owing to the disbursements made by said city on account of the further employment of engineers, inspectors and other employees, including all disbursements for office rent, transportation, supplies, and other matters connected with said employment; also the value of such other direct and computable damages as shall be caused by such failure; and the amount so appraised, when approved by said board, shall be deducted by said board out of such moneys as either may be due, or may at any time thereafter become due, to said contractor under and by virtue of this contract, or any part thereof; and in case said appraised value shall exceed the amount of said moneys, then said contractor will pay the amount

of such excess to said city, on notice from said board of the
468 excess so due; and it is hereby agreed that the decision of said chief engineer as to the said appraisal, when approved by said board, shall be final and binding on both parties to this contract.

167. **Assignments.**—Said contractor further agrees that he will give personal attention constantly to the faithful prosecution of the work, and will not assign or sublet the work or any part thereof, or any of the moneys or orders payable under this contract, without the previous written consent of said board endorsed on this contract; but will keep the same under his personal control; that no right under this contract, nor to any moneys or orders due or to become due hereunder, shall be asserted against said city or said board, or any department, officer or officers thereof, by reason of any so-called assignment, in law or equity, of this contract, or any part thereof, or of any moneys or orders payable thereunder, unless such assignment shall have been authorized by the written consent of said board endorsed on this contract; that no person other than said contractor now has any claim thereunder, and that no claim shall be made excepting under this specific clause of this contract, and under that clause relating to claims of workmen and materialmen.

168. **Abandonment.**—Said contractor further agrees that if the work to be done under this contract shall be abandoned, or if this contract shall be sublet or assigned by said contractor, or any of the moneys or orders payable thereunder shall be assigned, otherwise than as herein provided, or if at any time said chief engineer shall be of the opinion, and shall so certify in writing to said board, that the said work is unnecessarily or unreasonably delayed, or that said contractor is willfully violating any of the terms, covenants and agreements of this contract, or is not executing this contract in good faith, or is not making such progress in the execution of said work as to indicate its completion within the required time, said board shall have the power and right to notify said contractor to discontinue all work or any part thereof under this contract, and upon such notification said contractor shall discontinue said work, or such parts thereof, as said board may designate; and said board shall thereupon have the power to employ by contract, or otherwise, and in such manner and at such prices as it may determine, any persons and obtain any animals, carts, wagons, appliances, implements, tools, and other means of construction, which it may deem necessary to work at and be used to complete the work herein described, or such part thereof as said board may have designated; also the power to use such appliances, implements, tools and materials and means of construction of every description as may be found upon the line of said work, both such as enter into the
469 completed work, and such as are necessarily used in and about the same in the course of construction, and to procure other proper materials for the completion of the same; also to charge the expense of all of said labor, materials, animals, carts, wagons, appliances, implements, tools and means of construction to said contractor

and the expense so charged shall be deducted and paid by said board out of such moneys as may be due or become due at any time thereafter, to said contractor under this contract, or any part thereof. In case such expense is less than the sum which would have been payable under this contract if the same had been completed by said contractor, it is agreed that said contractor shall be entitled to receive the difference; and in case such expense shall exceed the sum which would have been payable under this contract if the same had been completed by said contractor, then said contractor shall pay the amount of such excess to said city, on notice from said board of the excess so due. It is further agreed that neither an extension of time, for any reason, beyond that fixed herein for the completion of the work, and the doing and the acceptance of any part of the work called for by this contract, shall be deemed to be a waiver by said city of the right to assume control of this contract for the reasons and in the manner hereinbefore provided.

169. **Cancellation of contract for default of contractor.**—In lieu of the exercise of the power hereinbefore given, in case of said contractor's default, to employ workmen, purchase tools and materials, and complete the work, said board reserves the right and option, instead thereof, to annul and cancel this contract and relet the work, or any part thereof, and said contractor shall not be entitled to any claim for damages on account of such annulment, nor shall such annulment affect the right of said city to recover damages which may arise from such failure on the part of said contractor to fulfill the terms of this contract. And in case of such annulment all moneys due said contractor, or retained under the terms of this contract, shall be forfeited to said city, and be paid to the credit of the fund for an additional water supply of said city; but such forfeiture shall, however, not release said contractor or his sureties for the fulfillment of this contract, and said contractor and his sureties shall be credited with the amount of the moneys so forfeited toward any greater sum that they may become liable for to said city on account of the default of said contractor.

170. **Cancellation of contract on account of litigation or other causes.**—Said contractor further agrees, that if, on account of any restraining litigation, or other litigation against said city, or said board, or if for any other reason, it may appear to said city, or said board, to be necessary, or for the interest of said city, to suspend the work entirely, and to cancel this contract wholly and completely, then said city and said board, or either of them, shall have the power at any time to cancel this contract wholly and completely, although said contractor may not be in default, and said contractor especially agrees that such cancellation, if done, shall not entitle him to any claim for damages, or for prospective profits on any work remaining to be done; but if said contractor be not in default, he shall be paid in full for all work done in accordance with this contract, up to the time of notice of such cancellation, and thereupon shall be released from all obligations hereunder for the completion of this contract.

171. **Protection of property.**—Said contractor further agrees, at his own cost and expense, to preserve, protect, and restore all properties that may be liable to injury or be affected in any manner by the work to be performed under this contract; and if he shall fail to do so, said board is hereby authorized and empowered to immediately preserve, protect or restore said properties, and the cost thereof shall be charged to said contractor, together with any damages sustained, and the cost so charged shall be paid to said city by said contractor within twenty (20) days after notice of the amount thereof, or said cost may be deducted from any money due, or to become due to said contractor under this contract.

172. **Claims of workmen and materialmen.**—Said contractor further agrees that he will pay punctually the workmen who shall be employed on the aforesaid work, and the persons who shall furnish material thereunder, and will furnish said board with satisfactory evidence that all persons who have done work or furnished materials under this contract, and shall have filed any account of such claims with said board, have been fully paid, or are not entitled to any lien under the laws of this State; and in case such evidence be not furnished as aforesaid, such amount as said board may consider necessary to meet the lawful claims of the persons aforesaid, shall be deducted from the moneys due said contractor under this contract, and shall not be allowed until the liabilities aforesaid shall have been fully discharged and the evidence thereof furnished said board; and if such evidence is not furnished before the final payment under this contract falls due, said board may pay such claims in whole or in part to the person or persons, firm or corporation claiming the same, and charge the amount thus paid to said contractor, who shall accept the same as payment to the amount thereof upon this contract.

173. **Suits.**—Said contractor further agrees that he will indemnify and save harmless said city and board, and the officers and agents thereof, from all claims, suits, actions, and proceedings of every name and description, which may be brought against said city or board, or the officers and agents thereof, for or on ac-
471 count of any injuries or damages to persons or property received or sustained by any person or persons, firm or corporation, by or from said contractor, or by or in consequence of any materials or explosives used on said work, or by or on account of any improper material or workmanship in its construction, or by or on account of any accident, or of any other act or omission of said contractor, or his agents, or servants, and said contractor also agrees that so much of the money due, or to become due, to him under this contract as shall be considered necessary by said board, may be retained by said board until all such suits or claims for damages, or otherwise, as aforesaid, shall have been finally settled and determined, and evidence to that effect furnished to the satisfaction of said board.

174. **Quantities approximated.**—It is further agreed by and between the parties hereto, that the quantities of the various classes of work to be done, and materials to be furnished, under this

contract, which have been estimated, as stated in the advertisement or notice of letting attached hereto, or in the form for proposals, are approximated, and submitted only for the purpose of comparing, on a uniform basis, the bids offered for the work under this contract; and said contractor further agrees that neither said city, nor said board, or either of them, are to be held responsible for any deviation or error whatever between the aforesaid quantities estimated and those required in the construction of said work; and that said contractor will make no claim for anticipated profits, or loss of profits, because of a difference between the quantities of the various classes of work actually done, or of materials actually delivered, and the estimated quantities thereof stated in the said advertisement or notice of letting.

175. **Corrections and deviations.**—Said contractor also agrees that said chief engineer shall decide as to the meaning and intent of any portion of the foregoing specifications, or of the plans, where the same may be found obscure or be in dispute; and said chief engineer shall have the right to correct any errors or omissions therein, when such corrections are necessary to the proper fulfillment of the intention of said plans and specifications; the action of such correction to date from the time said chief engineer gives due notice thereof. And it is also agreed by said contractor that said board may, at any time, make any changes in the location, form, dimensions, grades, and alignments, and may make any variations in the quantity of the work to be done, as exhibited in the advertisement or notice of letting hereto attached, or in the form of proposal or bid for said work, and may entirely exclude any of the items of work relating to said quantities at any time, either before the commencement of the work, or during its progress, without thereby altering or invalidating any of the
472 prices herein named, or this contract, in any other respect; should such action diminish the amount of work that would otherwise be done, no claim shall be made for damages on the ground of loss of anticipated profits on work so dispensed with; and should such action be taken after the commencement of any particular piece of work, and result thereby in extra cost to said contractor, said chief engineer shall certify to said board the amount to be allowed therefor, which he shall consider fair and equitable, as between the parties, and his decision, when approved by said board, shall be final and conclusive.

176. **Disputes.**—To prevent all disputes and litigation, it is further agreed by and between the parties to this contract, that said chief engineer shall be the referee, in all cases, to determine the amount, quality, acceptability and fitness of the several kinds of work which are to be paid for under this contract, and to decide upon all questions which may arise as to the fulfillment of said contract on the part of said contractor, and his decision and determination, when approved by said board, shall be final and conclusive. Said contractor shall also afford all reasonable facilities for access to his work to any other parties or contractors who may be doing extra work or be working on a section of the conduit adjacent to his own,

and any difference which may arise between two contractors in regard to their adjoining work is to be adjusted by said chief engineer, whose decision in the matter shall be final and binding upon both parties.

177. **Suspension of work.**—Said board reserves the right of suspending the whole, or any part of the work herein contracted to be done, if it shall deem it for the interest of said city so to do, without compensation or allowance to said contractor for such suspension, other than an extension of the time for the completion of the work as much as it may have been delayed by such suspension. And, if the said work shall be delayed for the reason that said city does not own, or has not obtained an easement in, and possession of, the land on which the same is to be performed, or in case the State authorities, or the courts, shall obstruct, or order a suspension of the work, or any part thereof, then, and in that case, and in every such case, said contractor shall be entitled to so much additional time wherein to perform and complete said contract on his part, as said chief engineer shall certify to said board in writing to be just. Said contractor agrees to submit to all such delays, suspensions or obstructions aforesaid, when ordered or notified by said board of the necessity thereof in writing, without compensation therefor, and hereby agrees that he will make no claim for damages against said city, or said board, or any of its officers or agents or servants, on account of such delays, suspensions, obstructions or orders, other than for such an extension of time as said chief engineer may deem just, within which to complete such
473 portions of the work as are affected by the delay, caused as aforesaid. It is also understood and agreed that should the date of the final completion be so extended, no rights of said city and said board, or either of them, under any clause of this contract, nor any obligation or liability of said contractor, or his sureties, shall be waived, lost or impaired by such extension, but every clause of this contract, and the accompanying bonds, shall apply in respect to the time, so extended by such written declaration of said board or chief engineer.

178. **Extra work.**—No claim for extra work shall be considered or allowed, unless such extra work shall have been previously ordered by said engineer, in writing. The claims for such extra work, when so ordered, shall be presented to said board on or before the 15th day of the month following that in which said extra work is done, otherwise such claims during that month will be forfeited and waived. In case any extra work shall be required in the proper performance of the work contemplated to be done under this contract, it is understood that said board reserves the right to have such extra work done by any other person, firm or corporation than the said contractor, unless an agreement upon the prices to be paid for such extra work can promptly be reached between said board and contractor. Should said extra work be let to any other person, firm, or corporation than said contractor, said contractor further agrees that he will not, in any way, interfere with, or molest, such

person, firm or corporation, and that said contractor will suspend such part of the work herein specified, or will carry on the same in such manner as he may be ordered by said engineer, so as to afford all reasonable facilities for doing such extra work; but said contractor agrees to make no claim for damages, or for any privileges or rights, other than expressed by this contract, by reason of the suspension and the doing of such extra work, except for an extension of time to perform this contract, as may be certified to said board in writing by said chief engineer, and approved by said board.

179. **Engineer and inspectors.**—Said contractor further agrees that whenever said chief engineer may be unable to act in consequence of absence, removal, or other cause, then such other engineer, or assistant, as said board shall designate, shall perform all the duties and be vested with all the powers herein given to said chief engineer, whether designated herein as such, or as engineer; and said contractor also agrees that said board shall be, and is hereby authorized to appoint such other person or persons, as it may deem proper to act in place of said engineer, or to inspect the work done and materials furnished under this contract, and see
that said work and materials conform to the plans, specifi-
474 cations and subsequent instructions and directions, and that
said person or persons, as well as said engineer, shall be afforded all proper facilities for discharging the duties assigned to them.

180. **Repairs.**—Said contractor further guarantees that all the work performed by him for said city under this contract will stand in good order against all casualties for twelve (12) months after the same shall have been faithfully completed, and accepted by said board; and he agrees that if at any time during a period of one year from the date of the final test, completion and acceptance of the work herein contemplated, any part of said work shall, in the opinion of said engineer, require repairing, and said engineer shall notify said contractor in person, or by mail, to make the repairs so required, then, if said contractor shall neglect to begin such repairs within three days from the date of giving or mailing such notice, or shall fail to proceed with such repairs to the satisfaction of said engineer, the said engineer shall have the right to employ such other person, or persons, as he may deem proper to make the same, either by contract, or otherwise, and said board shall pay the expenses out of the sum retained for that purpose by it, as hereinbefore mentioned. It is also agreed that if, at any time during said period of one year, it shall become necessary in said engineer's opinion to make any repairs to the said work immediately, the aforesaid notice is hereby waived by said contractor, and said engineer may cause such repairs to be made at once by any other person or persons, the expenses thereof to be paid by said board out of the sum retained as aforesaid.

181. **Contract Bonds.**—Said contractor further agrees that he will execute bonds, in such form and sum, and with such sureties as shall be approved by said board, conditioned to indemnify and save harmless said city and said board from all suits, actions or proceed-

ings of every name or description, in law or equity, brought against said city or said board, or both, or any officer or officers, agents or servants thereof, for or on account of any injuries or damages received or sustained by any person, structure or property, by or from said contractor, his servants or agents, in the prosecution of the work; or by or in consequence of any negligence in guarding the same; or by or on account of any act or omission of said contractor, or his servants or agents; and for the faithful performance of this contract and the payment of all workmen's wages by said contractor.

182. **Meaning.**—Said contractor hereby admits that he has read each and every clause in this contract, and fully understands the meaning of the same, and hereby agrees that he will comply with all the terms, covenants and agreements herein set forth.

475 **In Witness Whereof,** The chairman of said board has hereunto set his hand and seal, on behalf of said city, and said

and the parties hereto have executed this agreement in triplicate, two parts of which are to remain with said board, and the third to be delivered to said contractor, the day and year first above written.

Signed, sealed and delivered in the presence of the respective parties.

Chairman of the Executive Board of the City of Rochester.

Contractor.

STATE OF NEW YORK, } *ss:*
County of Monroe, City of Rochester, }

On this day of 189 , before me, personally came George W. Aldridge, to me known, and known to me to be the chairman of the executive board of the city of Rochester, described in and who executed the foregoing instrument, and he duly acknowledged that he executed the same, for and on behalf of said city.

476 STATE OF NEW YORK, } ss.:
County of ——, *City of* ——, }

On this day of 189 ,
before me, the subscriber, personally appeared

to
me personally known, and being by me duly sworn, did depose and say: I am the president

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and said seal affixed by me on behalf of said corporation by authority of the board of directors of said corporation; and said
as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

STATE OF NEW YORK, } ss.:
County of ——, *City of*——, }

On this day of 189 ,
before me, the subscriber, personally appeared

to me known to be the same person described in and who executed the foregoing instrument, and he duly acknowledged that he executed the same.

477 **CONTRACT BOND.**

Know all Men by These Presents, That

principal , residing in

and

sureties, are held and firmly bound unto the City of Rochester, New York, in the sum of seventy-five thousand dollars ($75,000.00), lawful money of the United States of America, to be paid to the said City of Rochester, its successors and assigns, for which payment, well and truly to be made, we bind ourselves, and each of our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals this day of in the year of our Lord one thousand eight hundred and ninety

The Condition of This Obligation is such that, whereas, the said

principal ha entered into a contract with said City of Rochester, bearing date the day of 189 , hereto annexed:

Now, Therefore, If the above-bounden

heirs, executors, administrators, successors or assigns, shall, in all things, stand to, and abide by, and well and truly keep and perform, the terms, covenants, conditions and agreements in said contract contained on part to be kept and performed, and each of them, at the time, and in the manner and form therein specified, and indemnify and save harmless said city, and the executive board thereof, and its officers and agents, as provided in said contract, then this obligation shall be null and void; otherwise to be and remain in full force and virtue.

478 **In Witness Whereof,** The parties hereto have hereunto set their hands and seals this day of in the year of our Lord one thousand eight hundred and ninety

479 STATE OF NEW YORK, } ss:
County of ——, *City of* ——, }

On this day of 189 ,
before me, the subscriber, personally appeared

to me known to be the same persons described in and who executed the foregoing instrument, and they severally duly acknowledged that they executed the same.

480 STATE OF NEW YORK, }
County of ——, *City of* ——, } *ss.:*

On this day of 189 ,
before me the subscriber, personally appeared

to me personally known, who, being by me duly sworn, did depose and say: I am the president of the

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said

as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

STATE OF NEW YORK, }
County of ——, *City of* ——, } *ss.:*

On this day of 189 ,
before me the subscriber, personally appeared

to me personally known, who, being by me duly sworn, did depose and say: I am the president of the

the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said

as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

481 STATE OF NEW YORK, } ss:
County of ——, *City of* ——, }

being duly sworn deposes and says: I am the president of

a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm, or corporation desiring the same; said

is worth the sum of
dollars, over and above all the debts now existing against said

either by way of bond, mortgage, or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of 189 .

482 STATE OF NEW YORK, } ss:
County of ——, *City of* ——, }

being duly sworn deposes and says: I am the president of

a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm, or corporation desiring the same; said

is worth the sum of
dollars, over and above all the debts now existing against said

either by way of bond, mortgage, or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of 189 .

483 STATE OF NEW YORK, }
County of ——, *City of* ——, } ss:

sureties within named, being duly sworn, depose and say, and each for himself says:

over and above all debts and liabilities which he owes or has incurred, and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me this day of 189 .

484 **LABORERS' BOND.**

Know all Men by These Presents, That

principal ,
residing in

and

sureties, are held and firmly bound unto the city of Rochester, N. Y., in the sum of seventy-five thousand dollars ($75,000), lawful money of the United States of America, to be paid to the said city of Rochester, its successors and assigns, for which payment well and truly to be made, we bind ourselves, and each of our heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed with our seals this day of , in the year of our Lord, one thousand eight hundred and ninety .

The condition of this obligation is such, that, whereas, the said

ha entered into a contract with the said city of Rochester, bearing date the day of 189 , hereto annexed :

485 **Now, Therefore,** If the above-bounden

principal heirs, executors, administrators, successors, or assigns shall pay, or cause to be paid the wages and compensation of all laborers who shall be employed in work on or about such contract and improvement, whether employed by said

or by any subcontractor, or employee, then this obligation to be void otherwise to be and remain in full force and effect.

In Witness Whereof, The parties hereto have hereunto set their hands and seals this day of in the year of our Lord one thousand eight hundred and ninety .

486 STATE OF NEW YORK, } ss:
County of ——, *City of* ——, }

On this day of , 189 , before me, the subscriber, personally appeared

to me known to be the same persons described in and who executed the foregoing instrument, and they severally duly acknowledged that they executed the same.

487 STATE OF NEW YORK, } ss:
County of ——, *City of* ——, }

sureties within named, being duly sworn, depose and say, and each for himself says: The said

that he is a freeholder of the State of New York and is worth the sum of

dollars

over and above all debts and liabilities which he owes or has incurred and exclusive of property exempt by law from levy and sale under an execution.

Subscribed and sworn to before me, this day of 189 .

ROCHESTER WATER WORKS.

488

1892.

DIAGRAMS

EXHIBTING LIMITS OF EXCAVATION AND MASONRY IN OPEN TRENCH AND TUNNEL WORK THAT WILL BE ESTIMATED FOR PAYMENT

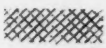
IN CONSTRUCTION OF

MASONRY WATER CONDUIT.

REFERENCE.

—·—·— INDICATES LIMIT OF AREA WITHIN WHICH EXCAVATION AND MASONRY WILL BE ESTIMATED FOR PAYMENT.

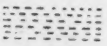
INDICATES BRICK OR RUBBLE LINING MASONRY PAID FOR.



INDICATES BRICK OR RUBBLE LINING MASONRY NOT PAID FOR.

INDICATES CONCRETE OR RUBBLE BACKING OR FILLING MASONRY PAID FOR.

INDICATES CONCRETE OR RUBBLE BACKING OR FILLING MASONRY NOT PAID FOR.



INDICATES DRY FILLING. PAYMENT FOR WHICH IS TO BE INCLUDED IN PRICES FOR EXCAVATION.

NOTE.—The following Diagrams are not drawn to scale. Inside dimensions of Conduit may be from 6 to 6½ feet high and wide, and the thickness of the brick or rubble lining Masonry may be varied according to circumstances and the kind of masonry used.

E. KUICHLING, Chief Engineer.

November 1, 1892.

492 EXHIBIT B. Nov. 14, 1896.

Exhibit B, November 14, 1896, is in all respects like Exhibit A, November 14, 1896, except in the following particulars:

On page 7, the following words are added to the first paragraph which begins, "The answer, etc., see annexed schedule of prices, duplicate form of contract, which are made part of this bid as though incorporated herein."

No prices are filled in on pages 6 to 15 inclusive.

On page 15 under the caption, "Time for completion of work," appears the following: "A A A. Least number of consecutive days after execution of contract required to complete the whole work, 400 days (400)."

On page 16 opposite the words, "Signature of person, firm or corporation making this bid," appears the signature, "Moffet, Hodgkins & Clarke Co., by C. T. Moffett, sec'y, post-office address, 16–22 Williams St. Dated Dec. 22, 1892, New York."

After the "note" beginning "The names of bidders," etc., appears in writing, "dated December 22, 1892, none outside of Moffett, Hodgkins & Clarke Co."

Pages 17 to 25 inclusive which in Exhibit A are blank are as follows:

17

Following are the full names and residences of the sureties who will sign the required bonds of the contract if this bid is accepted:

Sureties on bond for performance of contract:

HENRY D. LYMAN, *New York.*
AMERICAN SURETY CO., *New York.*

Sureties on bond for payment of workmen's wages:

HENRY D. LYMAN, *New York.*
AMERICAN SURETY CO., *New York.*

493 Following is a list of similar public works executed by the bidder, and of persons to whom the executive board is referred for information as to the qualifications and business standing of the bidder:

Have constructed about seventy (70) different water-works systems—including Peoria, Illinois ($2,000,000); including Butte, Montana (fifteen miles of conduit pipe from reservoir amounting to $1,500,000).

Proposal Bond.

Know all men by these presents, that we, the Moffett, Hodgkins & Clarke Co., principal, and Henry D. Lyman of New York city, and the American Surety Company of New York, having an office and principal place of business at 160 Broadway in the city and county of New York, State of New York, as sureties, parties of the first part, are held and firmly bound unto the city of Rochester, New York, party of the second part, in the sum of thirty thousand dollars ($30,000.00), lawful money of the United States of America, to be paid to the said city of Rochester, its successors or assigns, for which payment, well and truly to be made, we bind ourselves, our

heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

Sealed this 22nd day of December, in the year of our Lord, one thousand eight hundred and ninety-two.

Whereas, the executive board of the city of Rochester, N. Y., has advertised for sealed proposals for the construction of a masonry water conduit, tunnel, gate-house, overflow chambers, and the appurtenances thereto, commencing at the northeastern corner of Hemlock lake, Livingston county, N. Y., and terminating at a point on the outlet of said lake about 12,000 feet northerly; and said Moffett, Hodgkins & Clarke Co., principal, has made a proposal to said city of Rochester, bearing date the 22nd day of December, 1892, for the construction of the aforesaid work, which proposal is hereto annexed:

494 Now, therefore, the condition of this obligation is such, that if the proposal of said Moffett, Hodgkins & Clarke Co. is accepted by said board, and if said Moffett, Hodgkins & Clarke Co. shall perform the work, or furnish the materials, or both, mentioned in such proposal, and shall at such time and place as may be required by said board, well and truly enter into the contract with said city, hereto attached, and give the bonds and undertakings and sureties therein required without fraud or delay, then this obligation shall be void, otherwise to be and remain in full force and effect; and

Whereas the damages that may be sustained by said party of the second part from any default or failure on the part of said Moffett, Hodgkins & Clarke Co., principal as aforesaid, are certain and the proof thereof by legal evidence is difficult, if not impossible:

Now, therefore, it is covenanted and agreed by and between the parties hereto, and each of them, and made an express condition of this obligation, that for a failure and default on the part of said Moffett, Hodgkins & Clarke Co., principal, to enter into said written contract and give said bonds, undertakings and sureties, or to do either, the damages payable and recoverable upon this bond shall not be the penalty therefor, but shall be the sum of thirty thousand dollars ($30,000.00), and interest thereon from the date of such default. The said sum is hereby agreed upon and fixed as reasonable under the circumstances, and that which shall be paid by the obligators above named as liquidated damages hereon.

In witness whereof the said Henry D. Lyman has hereunto set his hand and seal, and the said above-bounden corporation, principal and surety, have hereunto caused their respective corporate seals to be affixed and these presents signed by their respective duly authorized officers this 22nd day of December, 1892.

495 Signature of principal and sureties:

MOFFETT, HODGKINS & CLARKE CO.,
By J. F. MOFFET, *President.*
HENRY D. LYMAN. [SEAL.]
AMERICAN SURETY COMPANY OF NEW YORK,
By W. L. TRENHOLM, *President.*
W. E. KEYES, *Secretary.*

[L. S., A. S. Co.]

(*Acknowledgment for Individuals.*)

STATE OF NEW YORK,
County of New York, City of New York, } ss.:

On this 22nd day of December, 1892, before me, the subscriber, personally appeared Henry D. Lyman to me known to be the same person described in and who executed the foregoing instrument, and he duly acknowledged that he executed the same.

L. E. CARMAN,
Notary Public No. 83, *New York County.*

Certificate filed in Kings Co.

STATE, CITY, AND COUNTY OF NEW YORK, ss.:

On this 22nd day of December, 1892, before me personally appeared W. L. Trenholm, president of the American Surety Company, with whom I am personally acquainted, who being by me duly sworn, said: that he resided in the city of New York; that he is the president of the American Surety Company of New York; that he knew the corporate seal of said company; that the seal affixed to the foregoing instrument is such corporate seal; that it was affixed by order of the board of directors of said company, and that he signed said instrument as president of said company by like authority; and that the liabilities of said company do not exceed its assets as ascertained in the manner provided in section 3, chapter 486, of the New York Session Laws of 1881. And the said
496 W. L. Trenholm further said that he was acquainted with Wm. E. Keyes and knew him to be the secretary of said company; that the signature of said Wm. E. Keyes, subscribed to the said instrument, is in the genuine handwriting of the said Wm. E. Keyes, and was thereto subscribed by the like order of the said board of directors, and in the presence of him, the said W. L. Trenholm, president.

L. E. CARMAN,
[L. S.] *Notary Public No.* 83, *New York County.*

Certificate filed in Kings county.

(*Acknowledgment for a Corporation.*)

STATE OF NEW YORK,
County of New York, City of New York, } ss.:

On this 22nd day of December, 1892, before me the subscriber, personally appeared J. F. Moffett, to me personally known, who, being by me duly sworn, did depose and say: I am the president of the Moffett, Hodgkins & Clarke Company; the seal affixed to the foregoing instrument is the corporate seal of said corporation; said instrument was signed and sealed by me on behalf of said corporation by authority of its board of directors; and the said J. F. Moffett,

as such president, duly acknowledged said instrument to be the free act and deed of said corporation.

F. D. ROUNDS,
[L. S.] *Notary Public, N. Y. County.*

(*Justification for Personal Sureties.*)

STATE OF NEW YORK,
County of New York, City of New York, } ss.:

Henry D. Lyman, one of the sureties within named, being duly sworn, deposes and says: that he resides in the city of New
497 York, N. Y., and is a householder in said city; that he is worth the sum of twenty-five thousand dollars over and above all debts and liabilities which he owes, or has incurred, and exclusive of property exempt by law from levy and sale under an execution.

Signature of sureties: HENRY D. LYMAN.

Subscribed and sworn to before me this 22nd day of December, 1892.

L. E. CARMAN,
Notary Public No. 83, New York County.

Certificate filed in Kings county.

(*Justification for a Surety Company.*)

STATE OF NEW YORK,
County of New York, City of New York, } ss.:

Wm. L. Trenholm, being duly sworn, deposes and says: I am the president of American Surety Company of New York, a company duly incorporated and organized under the laws of the State of New York, for the purpose of furnishing bonds and sureties to or for any person, firm or corporation desiring the same; said American Surety Company of New York is worth the sum of sixty thousand dollars, over and above all the debts now existing against said American Surety Company of New York, either by way of bond, mortgage or certificates of indebtedness, or any other form of indebtedness, and exclusive of property exempt by law from levy and sale under an execution.

WM. L. TRENHOLM.

Subscribed and sworn to before me this 22nd day of December, 1892.

L. E. CARMAN,
Notary Public No. 83, New York County.

Certificate filed in Kings county.

498 Fidelity bonds guarantee. Incorporated April 14, 1884.

American Surety Company of New York.

General offices, No. 160 Broadway.

Financial Statement, June 30, 1892

Resources:

United States Governments	market value		$292,500.00	
New York City Consolidated stock	"	"	100,000.00	
Consolidated Gas Company stock	"	"	11,500.00	
Western Union Telegraph Company stock	"	"	112,800.00	
Cleve'd, Cin'ti, Chicago and St. Louis R'w'y Co. stock	"	"	48,000.00	
Missouri, Kansas and Texas Railway Company bonds	"	"	28,000.00	
St. Louis, Iron Mountain and So. R'w'y Company bonds	"	"	15,300.00	
The State Trust Company stock	"	"	392,040.00	
				$1,000,140.00
Real estate and improvements				225,732.44
First liens and mortgages				298,569.12
Demand loans and bills receivable				27,462.60
Accrued interest, dividends and rents				18,192.23
Cash in banks and office				25,852.10
Premiums in course of collection				47,714.51
				$1,643,663.00

Liabilities:

Capital stock	$1,000,000.00	
Premium-reserve requirement	261,993.47	
Claims in process of adjustment	137,027.79	
Net surplus	244,641.74	
		$1,643,663.00

499 CITY AND COUNTY OF NEW YORK, *ss:*

Wm. E. Keyes, being duly sworn, deposes and says, that he is the secretary of the American Surety Company of New York; that the foregoing is a true and correct statement of the financial condition of said surety company, as of June 30, 1892, to the best knowledge, information and belief of deponent. That on the 1st day of October, 1892, the capital stock of said company was increased to two million dollars and five hundred thousand added to the surplus.

WM. E. KEYES.

Sworn to before me this 22nd day of December, 1892.

[L. S.]

L. E. CARMAN,
Notary Public, New York County.

501 Circuit Court of the United States, Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY, Complainant, *ag'st* THE CITY OF ROCHESTER and Others, Defendants. } In Equity. No. 6132.

It is hereby stipulated that the foregoing record is a correct transcript of the testimony taken on behalf of the complainants and defendants, and that the exhibits attached thereto are correct and accurate copies of the original exhibits offered and marked in evidence, and that the statement on page 134 of Complainant's Record and pages 189–196 of Defendants' Record as to the nature of Exhibit 1 B, March 10, 1894, and Exhibit B, are correct statements as to said exhibits, and that the same may be filed with the clerk of this court, and made a part of the record upon appeal with the same effect as if the original testimony and original exhibits had been filed, and that the foregoing printed record, evidence and exhibits shall constitute the orignal record for complainant and defendants.

GUGGENHEIMER, UNTERMYER & MARSHALL,
Solicitors for Complainant and Respondent.
A. J. RODENBECK,
Solicitor for Defendants and Appellants.

Dated October 11, 1897.

502 *Equity Subpœna.*

The President of the United States of America to the City of Rochester, George W. Aldridge, William W. Barnard, and John U. Schroth, composing the executive board of the city of Rochester, Greeting:

You are hereby commanded that you personally appear before the judges of the circuit court of the United States for [L. S.] the northern district of New York, in the second circuit, on the first Monday in March, 1893, to answer to a bill of complaint exhibited against you in said court by Moffett, Hodgkins & Clarke Company, and to do further and receive whatever said court shall have considered in that behalf, and this you are not to omit under the penalty of two hundred and fifty dollars.

Witness, the Honorable Melville W. Fuller, Chief Justice of the Supreme Court of the United States, at the city of Utica, in said northern district, the eighteenth day of January, eighteen hundred and ninety-three.

W. S. DOOLITTLE, *Clerk.*

JENNEY & MARSHALL,
Solicitors for Complainant.

MEMORANDUM.—The defendant is to enter his appearance in the suit above mentioned in the clerk's office at Utica on or before the day at which the above subpœna is returnable, otherwise the bill may be taken *pro confesso*.

W. S. DOOLITTLE, *Clerk*.

503 UNITED STATES OF AMERICA, *Northern District of New York*, } ss:

I hereby certify, that on the 19th day of January, 1893, at Rochester, N. Y., in my district, I personally served the within writ of subpœna on the within-named defendants by showing the same to each of them, with the seal of the court thereon, and at the same time delivering and leaving with each of them a true copy thereof.

A. E. BAXTER,
U. S. Marshal.
WM. J. CAINE, *Deputy*.

Marshal's Fees.

Service	$8 00
Mileage	8 04
	$16 04

(Endorsed:) Equity subpœna. Filed Jan. 20, 1893. W. S. Doolittle, clerk.

504 *Præcipe of Appearance.*

Circuit Court of the United States for the Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY, Plaintiff, *against* THE CITY OF ROCHESTER and Others, Defendants.

To W. S. Doolittle, Esq., clerk of the United States circuit court for the northern district of New York.

SIR: You will please enter my appearance for the defendants in the above-entitled action.

Dated at Rochester, N. Y., March 4, 1893.

Yours, &c.,
C. D. KIEHEL,
Attorney for the Defendants,
19 *City Hall Building, Rochester, N. Y.*

(Endorsed:) Præcipe of appearance. Filed Mar. 6, 1893. W. S. Doolittle, clerk.

505 *Replication.*

United States Circuit Court, Northern District of New York.

MOFFETT, HODGKINS & CLARKE CO.
vs.
THE CITY OF ROCHESTER, GEORGE W. Aldridge, William W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, N. Y. } In Equity. No. 6132.

This replicant, The Moffett, Hodgkins & Clarke Company, saving and reserving to itself all and all manner of advantage of exception which may be had or taken to the manifold errors, uncertainties, and insufficiencies of the answer of the said defendants, for replication thereunto says that it does and will aver, maintain and prove its said bill to be true, certain and sufficient in the law to be answered unto by the said defendants, and that the answer of the said defendants is uncertain, evasive and insufficient in law to be replied unto by this replicant; without that, that any other matter or thing in the said answer contained material or effectual in the law to be replied unto and not herein and hereby well and sufficiently replied unto, confessed or avoided, traversed or denied, is true: all which matters and things this replicant is ready to aver, maintain and prove as this honorable court shall direct and
506 humbly pray as in and by *their* said bill *they have* already prayed.

Dated November 29, 1893.

JENNEY & MARSHALL,
Compl't's Solicitors.

LOUIS MARSHALL, *Of Counsel.*

(Endorsed:) Replication. Filed Dec. 1. 1893. W. S. Doolittle, clerk.

507 United States Circuit Court, Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY
vs.
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, N. Y.

The above-named complainant having filed in the office of the clerk of this court a verified bill of complaint and the schedules thereto consisting of a tabulated statement of the bids received by the defendants for the work to be performed under a proposed contract known as contract No. 2, for a riveted steel pipe conduit for the water works of the defendant, of copies of the resolutions adopted by the executive board of the city of Rochester on January 12, 1893, with respect to said contract, of a copy of the bond filed by the com-

plainant with the defendants upon the presentation of its proposals for contract No. 2, of the pamphlet entitled "Rochester water works, 1892. Notice of letting and forms of proposal, contract and specifications for contract No. 2 for constructing steel-pipe conduit and appurtenances for the city of Rochester, N. Y.," and the allegations of said complaint having been duly considered, and said complainant having also presented to me at this time the affidavits of
508 Edwin H. Burlingame and Louis Marshall and a notice of motion for an injunction in conformity with the prayer of relief contained in said bill of complaint, which motion is noticed before me at the court-rooms of the United States circuit court on the 7th day of February 1893, at the city of Utica, N. Y., and it appearing to my satisfaction that unless the defendant should in the meantime and until the hearing and determination of said motion be restrained as requested in and by said notice of motion, the said complainant would suffer irreparable injury; now, on motion of Louis Marshall, Esq., of counsel for the complainant, it is

Ordered, that the defendants above named, and each and every of them, and each and every of their officers, attorneys, agents and clerks, be and they hereby are, under the penalties by law prescribed, restrained and enjoined until the further order of the court in the premises, from in any way declaring the complainant herein in default with respect to the proposals made by it for the work of laying a 38-inch pipe on line "B" and furnishing the materials therefor specified in contract No. 2 hereinbefore referred to, from declaring the bond executed by and on behalf of the complainant, also hereinbefore referred to, forfeited, from in any manner suing upon or attempting to enforce or collect the said bond.

Dated Albany, N. Y., January 18, 1893.

ALFRED C. COXE, *U. S. J.*

(Endorsed:) Injunction order. Notice of motion and affidavits. Filed Jan'y 18, 1893. W. S. Doolittle, clerk.

509 *Order for Injunction Pendente Lite.*

At a term of the circuit court of the United States, held in and for the northern district of New York, at the city of Utica, on the 14th day of February, A. D. 1893.

Present: Hon. Alfred C. Coxe, judge.

MOFFETT, HODGKINS & CLARKE COMPANY *vs.* THE CITY OF ROCHESTER, GEORGE W. Aldridge, William W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, N. Y.	In Equity. No. 6132.

The motion heretofore noticed by the above complainant for an order enjoining and restraining the defendants and each and every of them, and each and every of their officers *pendente lite*, as prayed

in said motion, having been reserved for argument until this time, after reading and filing the verified bill of complaint herein, and the schedules thereto annexed and the affidavits of Edward H. Burlingame and Louis Marshall, verified January 18, 1893, and the exhibit thereto annexed, and said notice of motion on behalf of the complainant, and the affidavits of Emil Kuschling and Thomas J. Neville, verified February 6, 1893, and the map thereto annexed, after hearing Louis Marshall, of counsel for the complainant, and C. D. Kiehel, Esq., of counsel for defendants,

510 Ordered, that the defendants above named, and each and every of them, and each and every of their officers, attorneys, agents, and clerks and each and every of them, be and they are hereby enjoined and restrained during the pendency of this action under the penalties by law prescribed, from in any manner declaring the complainant in default with respect to the proposal made by it for the work of laying a 38-inch pipe upon route B and furnishing materials therefor, specified in contract No. 2, described in the bill of complaint; from declaring the bond executed by and on behalf of the complainant described in said complaint forfeited, and from in any manner suing upon, or attempting to enforce or collect said bond.

ALFRED C. COXE, *U. S. J.*

(Endorsed:) Order for injunction *pendente lite.* Filed Feb. 14, 1893. W. S. Doolittle, clerk.

Stipulation and Order.

Circuit Court of the United States for the Northern District of New York.

MOFFETT, HODGKINS AND CLARKE COMPANY *ag'st* THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, &C., Members of Executive Board. } In Equity.

The City of Rochester, and its attorney, C. D. Kiehel, Esq., hereby consent that A. J. Rodenbeck, Esq., of Rochester, N. Y., be

511 substituted in the place and stead of C. D. Kiehel, Esq., as attorney for the above-named defendant in this action.

Dated at Rochester, N. Y., June 1, 1894.

GEORGE W. ALDRIDGE, *Mayor, &c.*
C. D. KIEHEL,
Attorney for the Defendant.

At a term of the United States circuit court, held at the court-house in the city of Utica, N. Y., in and for the northern district of New York, on the 20th day of July, 1894.

Present: Hon. Alfred C. Coxe, one of the justices of said court.

Circuit Court of the United States for the Northern District of New York.

MOFFETT, HODGKINS AND CLARKE COMPANY *ag'st* THE CITY OF ROCHESTER, GEORGE W. Aldridge, &c., Members of Executive Board. } Order Granted on the 20th Day of July, 1894.

On reading and filing the written consent of the defendant and C. D. Kiehel, Esq., defendant's attorney, and on motion of H. F. Remington, of counsel for the defendant, it is

512 Ordered, that A. J. Rodenbeck, Esq., of Rochester, N. Y., be, and he hereby is, substituted as the attorney for the defendant in the above-entitled action.

ALFRED C. COXE, *U. S. J.*

(Endorsed:) Stipulation, order and notice of substitution of defendant's attorney. Filed July 20, 1894. W. S. Doolittle, clerk.

At a term of the circuit court of the United States for the northern district of New York, held at chambers thereof, at the city of Utica, New York, on the 14th day of June, 1897.

Present: Hon. Alfred C. Coxe, justice.

MOFFETT, HODGKINS & CLARKE COMPANY, Complainants, *against* THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, and Others, Defendants.

On reading and filing the annexed stipulation, it is, on motion of Messrs. Guggenheimer, Untermyer & Marshall,

Ordered, that Guggenheimer, Untermyer & Marshall, attorneys-at-law, be and they hereby are substituted as solicitors for

513 the complainants in the above-entitled suit in the place and stead of Jenney & Marshall.

By the COURT: The clerk will enter.

C. W. HIGGISON,
Dep'ty Clerk.

Circuit Court of the United States for the Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY, Complainants, *against* THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, and Others, Defendants. } In Equity.

It is hereby stipulated, that Messrs. Guggenheimer, Untermyer & Marshall, attorneys-at-law, of the city of New York, be substituted as solicitors for the complainants in the above suit in the place and

stead of Messrs. Jenney & Marshall, and that an order to that effect may be entered without further notice.

Dated New York, May —, 1897.

JENNEY & MARSHALL,
Compl'ts' Sol'rs.

(Endorsed:) Stipulation and order of substitution. Filed June 14, 1897. W. S. Doolittle, clerk.

514 United States Circuit Court, Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY
vs.
THE CITY OF ROCHESTER ET AL.

Final Hearing in Equity.

Louis Marshall and Joseph Mullin, for the complainant.
William F. Cogswell and A. J. Rodenbeck for the defendants.

COXE, *J.:*

The question in this controversy is plain and simple: Shall the complainant be held to an erroneous bid by which it agreed to do certain work for the city of Rochester for $63,800 less than was intended? The work related to the construction of a conduit to convey the water of Hemlock lake to the city. By a mistake of Mr. Burlingame, its engineer, the complainant bid fifty cents per cubic yard for earth excavation in open trenches when it intended to bid seventy cents, and one dollar and fifty cents for earth excavation in tunnel when it intended to bid fifteen dollars.

The proof of these mistakes is clear, explicit and undisputed. As soon as the item proposing to do the work for fifty cents, as aforesaid, was read at the meeting of the executive board, and before any action was taken thereon, Mr. Burlingame stated that it was an error, and that complainant intended to bid for route B the same as for route A, viz: seventy cents.

515 There is some testimony of a negative character that this prompt repudiation of the bid did not take place, but the great weight of testimony is in favor of the complainant. Had the errors been corrected the complainant's bid would still have been $200,000 below the next lowest bid. On route A the complainant's bid was $903,324. The mistakes all occurred on route B, and yet route A was selected and the work awarded to other bidders for $1,123,920, or $220,596 more than the complainant's proposal.

Upon the principal issue there is no disputed question of fact. Counsel for the defendants, though not admitting the mistakes, which are the basis of the action, do not dispute them. The oral argument proceeded upon the theory that the mistakes were made precisely as alleged.

In order that no injustice may be done to the defendants, their position in this regard is stated in the language of their brief, as follows:

"We admit that the evidence of the complainant shows that Mr. Burlingame entered in his proposal sheets certain figures, the numbers different from those which he intended to make, and that the defendants have no evidence to contradict his testimony."

The facts being undisputed the question is one of law. It would seem almost a reproach to our jurisprudence if equity be compelled to confess itself helpless in such circumstances. To grant the relief asked for does no injury to any one. To refuse it entails upon the complainant a possible loss of $90,000; a penalty so out of proportion to its fault that its enforcement would seem repugnant to those principles of natural justice which are the foundation of all law.

The learned senior counsel for the defendants concedes that were this a dispute between individuals, "the one making the proposal can undoubtedly withdraw the same at any time before ac-
516 ceptance by the person to whom such proposal is made." He concludes, however, that the rule is different where competitive proposals are invited for public work. Why this difference the court is unable to perceive. The law is based upon broad, general rules, applicable alike to individuals and corporations. A party dealing with a municipal corporation should not be held to the strict letter of his agreement where he would be released if dealing with an individual. But it is argued though relief might be granted in other circumstances, there can be none here, for the reason that the charter of the city of Rochester provides that "neither the principal nor sureties on any bid or bond shall have the right to withdraw or cancel the same until the board shall have let the contract for which such bid is made, and the same shall have been duly executed." It is thought that this clause is not applicable to the peculiar facts here shown. The complainant is not endeavoring "to withdraw or cancel a bid or bond." The bill proceeds upon the theory that the bid upon which the defendants acted was not the complainant's bid; that the complainant was no more responsible for it than if it had been the result of agraphia or the mistake of a copyist or printer. In other words, that the proposal read at the meeting of the board was one which the complainant never intended to make, and that the minds of the parties never met upon a contract based thereon. If the defendants are correct in their contention there is absolutely no redress for a bidder for public work, no matter how aggravated or palpable his blunder. The moment his proposal is opened by the executive board he is held as in a grasp of steel. There is no remedy, no escape. If, through an error of his clerk, he has agreed to do work worth a million dollars for ten dollars, he must be held to the strict letter of his contract while equity stands by with folded hands and sees him driven into bankruptcy. The defendant's position admits of no compromise, no exception, no middle ground.

517 It is argued that the mistakes were not mutual and, therefore, that there is no ground of equitable cognizance. It should be remembered, however, that the complainant does not seek to reform a contract, but to be relieved from an unconscionable bid by its rescission or cancellation. Equity cannot reform an agree-

ment unless both parties were mistaken, but it can interfere to prevent the enforcement of an unjust agreement induced by the mistake of one.

This principle is well expressed in the Am. Enc. of Law, as follows:

"Equity will not reform a written contract unless the mistake is proved to be the mistake of both parties, but may rescind and cancel a contract upon the ground of a mistake of facts, material to the contract, of one party only" (vol. 15, p. 647).

Prof. Pomeroy says:

"Cancellation is proper when there is an apparently valid written agreement or transaction embodied in writing, while, in fact, by reason of a mistake of both or one of the parties, either no agreement at all has really been made, since the minds of both parties have failed to meet upon the same matters, or else the agreement or transaction is different, with respect to its subject-matter or terms, from that which was intended" (2 *Eq. Jur.*, § 870).

See also *Crowe v. Lewin*, 95 *N. Y.*, 423; *Smith v. Mackin*, 4 *Lansing*, 41; *Bradford v. Union Bank*, 13 *How.*, 57, 68; *H. & N. H. R. Co. v. Jackson*, 24 *Conn.*, 514; *Snell v. Ins. Co.*, 98 *U. S.*, 85.

It is said that the complainant has an adequate remedy at law. This objection does not appeal strongly to the court in a case where all the parties are on the record, where all the facts bearing upon the transaction have been collected with great diligence and expense,
and where the questions in dispute have been fully and ably
518 debated. In such circumstances the court should not, unless clearly compelled to do so, adopt a course which will render nugatory all this labor and expense. Believing that the complainant is entitled to relief, the duty of granting it should not be devolved upon another tribunal in order that a doubtful theory may be vindicated. But is there a legal remedy? How could the complainant in an action on the bond take advantage of its mistakes? If a court of law could not declare the proposal rescinded for mistake it would be compelled to treat the complainant as in default and enforce the bond.

The complainant is entitled to a decree rescinding its proposals, and enjoining the defendants as prayed for in the bill.

(Endorsed:) Decision, Coxe, J. Filed Aug. 18, 1897. W. S. Doolittle, clerk.

519 *Decree.*

United States Circuit Court for the Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY, Complainants,
against
THE CITY OF ROCHESTER, GEORGE W. Aldridge, William W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, Defendants.
} In Equity. No. 6132.

This cause coming on for final hearing upon the bill of complaint herein, the answer of the defendants and the proofs, oral, documentary, and written, taken and filed in said cause on behalf of the complainants and defendants respectively, and after hearing argument by Louis Marshall, Esq., and Joseph Mullin, Esq., counsel for the complainants, and William F. Cogswell, Esq., and A. J. Rodenbeck, Esq., counsel for the defendants:

Now, therefore, on consideration thereon, and on motion of Messrs. Guggenheimer, Untermyer & Marshall, solicitors for the complainants,

It is hereby ordered, adjudged and decreed, and the court doth hereby order, adjudge and decree, that the bids and proposals
520 of Moffett, Hodgkins & Clarke Company, the complainants, for laying a 38-inch riveted steel pipe conduit on line or route "B," as designated by the printed form of proposal and specifications issued by the defendants in a pamphlet, forming a part of the record herein, entitled "Rochester water works 1892—notice of letting and forms of proposal, contract, and specifications for contract No. 2 for constructing steel-pipe conduit and appurtenances for the city of Rochester, N. Y.," which proposals were submitted by the said complainants to the defendants, composing the executive board of the city of Rochester, N. Y., on the 23d day of December, 1892, be and the same hereby are rescinded, canceled, and declared null, void, and of no effect, and as though the same had never been made; and

It is further ordered, adjudged and decreed that a writ of injunction issue out of and under the seal of this court, perpetually restraining and enjoining said defendants, The City of Rochester, and George W. Aldridge, William W. Barnard, and John U. Schroth, composing the executive board of the city of Rochester and their successors in office, and each and every one of the said defendants and of their successors, and their several clerks, attorneys, and agents, from in any way declaring the Moffett, Hodgkins & Clarke Company, the complainants, in default with respect to the aforesaid bids and proposals made by it for the work of laying a 38-inch pipe or line or route "B" aforesaid, and furnishing materials therefor, or from declaring forfeited the bond executed by and on behalf of said complainants and accompanying the aforesaid bid and pro-

posals, or from in any manner suing upon, or attempting to enforce or collect the said bond.

Dated September 6, 1897.

ALFRED C. COXE, *U. S. J.*

521 I hereby approve the foregoing judgment as to form without prejudice to defendants' right to appeal or otherwise.

A. J. RODENBECK,
Defendants' Solicitor.

(Endorsed:) Decree. Filed Sept. 9, 1897. W. S. Doolittle, clerk.

Petition on Appeal.

United States Circuit Court, Northern District of New York.

MOFFETT, HODGKINS & CLARKE COMPANY, Complainants and Respondents, *ag't* THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, William W. Barnard, John U. Schroth, Composing the Executive Board of the City of Rochester, Defendants and Appellants.	In Equity. No. 6132.

The above-named defendants, conceiving themselves aggrieved by the degree filed and entered in the office of the clerk of this court on the 9th day of September, 1897, in the above-entitled cause, rescinding the proposal of complainants for laying a 38-inch pipe under contract No. 2, and enjoining the defendants from in any way declaring complainants in default with respect to said
522 proposal, and from declaring the bond executed by and on behalf of complainants forfeited, and from in any manner suing upon or attempting to enforce or collect said bond, do hereby appeal therefrom to the United States circuit court of appeals for the second circuit, and pray that their appeal may be allowed and a citation granted directed to the above-named complainants, commanding them to appear before the United States circuit court of appeals for the second circuit, to take and receive what may appertain to justice to be done in the premises, and that a transcript of the record, proceedings and evidence in said cause, duly authenticated, may be sent to the said United States circuit court of appeals for the second circuit.

Dated Rochester, N. Y., September 14, 1897.

A. J. RODENBECK,
Defendants' Solicitor.

A proper security for costs having been given, it is—

Ordered, that the foregoing be and the same is hereby allowed.

Dated Utica, N. Y., Oct. 4, 1897.

ALFRED C. COXE, *U. S. J.*

(Endorsed:) Petition of appeal. Due notice of a copy of the within petition admitted this — day of Oct., 1897. ——— ———, compl'ts' solicitor. Filed Oct. 5, 1897. W. S. Doolittle, clerk.

523 *Petition for Appeal.*

Circuit Court, United States of America, for the Northern District of New York.

THE MOFFETT, HODGKINS & CLARKE CO., Complainants and Respondents,
ag'st
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, Defendants and Appellants.

Petition for appeal.

To the Hon. Alfred C. Coxe, judge of the United States court:

Your petitioners, The City of Rochester, George W. Aldridge, William W. Barnard and John U. Schroth, composing the executive board of the city of Rochester, the defendants in the above-entitled cause would respectfully represent and show that in the above-entitled cause pending in the United States circuit court, in and for the northern district of New York, there was entered on the 9th day of September, 1895, of said court, a final decree greatly to the prejudice and injury of your petitioners, which said decree is erroneous and inequitable in many particulars;

524 Wherefore, in order that your petitioners may obtain relief in the premises and have opportunity to show the errors complained of, your petitioners pray that they may be allowed an appeal in said cause at the United States circuit court of appeals for the second district, and that the proper orders touching the securities required of them may be made.

THE CITY OF ROCHESTER,
GEORGE W. ALDRIDGE,
WILLIAM W. BARNARD,
JOHN U. SCHROTH,
Composing the Executive Board of the City of Rochester, Defendants,
By A. J. RODENBECK,
Defendants' Solicitor.

(Endorsed:) Petition for appeal. $250 security may be given by defendants on appeal, which is hereby allowed. No additional bond is required. Oct. 4, 1897. A. C. Coxe, U. S. J. Filed Oct. 5, 1897. W. S. Doolittle, clerk.

525 *Bond for Damages and Costs.*

Circuit Court of the United States of America for the Northern District of New York, in the Second Circuit.

THE MOFFETT, HODGKINS & CLARKE COMPANY, Complainants and Respondents,
ag'st
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, Defendants and Appellants.

Know all men by these presents, that we, Ednor A. Marsh and Chas. Dubelbeiss are held and firmly bound unto the above-named complainants in the sum of two hundred fifty dollars, to be paid to the said complainants, for the payment of which well and truly to be made we bind ourselves and each of us, our and each of our heirs, executors and administrators jointly and severally firmly by these presents.

Sealed with our seals and dated the 29th day of September in the year of our Lord one thousand eight hundred and ninety-seven.

Whereas, the above-named defendants have prosecuted an appeal to the United States circuit court of appeals for the second district to reverse the decree rendered in the above-entitled suit by
526 the judge of the circuit court of the United States for the northern district of New York:

Now, therefore, the condition of this obligation is such, that if the above-named defendants shall prosecute said appeal to effect and answer all damages and costs then this obligation shall be void, otherwise the same shall be and remain in full force and virtue.

EDNOR A. MARSH. [L. S.]
CHAS. DUBELBEISS. [L. S.]

Sealed and delivered, taken and acknowledged this 29th day of September, 1897, before me—

GEO. L. MATTISON,
[L. S.] *Notary Public, Rochester, N. Y.*

UNITED STATES OF AMERICA, }
Northern District of New York. }

STATE OF NEW YORK, }
County of Monroe, City of Rochester, } *ss:*

E. A. Marsh, Chas. Dubelbeiss, being duly and severally sworn, do depose and say: that they are freeholders within the city of Rochester, and they are each worth the sum of five hundred dollars over and above all their just debts and liabilities.

E. A. MARSH. [L. S.]
CHAS. DUBELBEISS. [L. S.]

Sworn to this 29th day of September, 1897, before me—
GEO. L. MATTISON,
[L. S.] *Notary Public, Rochester, N. Y.*

Approved:
ALFRED C. COXE, *U. S. J.*

Oct. 4, 1897.

(Endorsed:) Bond for damages and costs. Filed Oct. 5, 1897. W. S. Doolittle, clerk.

527 *Assignment of Errors.*

Circuit Court of the United States of America for the Northern District of New York, in the Second Circuit.

THE MOFFETT, HODGKINS & CLARKE COMPANY, Complainants and Respondents,
ag'st
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John U. Schroth, Composing the Executive Board of the City of Rochester, Defendants and Appellants.

And now come the defendants and say that in the records and proceedings of the said court in the above-entitled cause, and in the decree made and entered on the 9th day of September, 1897, there is manifest error, and for error the defendants assign the following:

1. The court erred in holding that the complainants made an erroneous bid to do certain work for the city of Rochester, for $63,800 less than was intended.

2. The court erred in holding that the engineer of complainants made a mistake in bidding so that complainants bid fifty
528 cents per cubic yard for earth excavation in open trenches when it intended to bid seventy cents and one dollar and fifty cents for earth excavation in tunnel when it intended to bid fifteen dollars.

3. The court erred in holding that the proof of these mistakes was clear, explicit and undisputed.

4. The court erred in holding that as soon as the item proposing to do the work for fifty cents as aforesaid was read at the meeting of the executive board, and before any action was taken thereon complainants' engineer stated that it was an error, and that complainants intended to bid for route B the same as for route A, viz., seventy cents, and that the weight of testimony concerning this alleged error was in favor of complainants.

5. The court erred in holding that upon the principal issue there is no disputed question of fact.

6. The court erred in holding that defendants do not dispute the alleged mistakes.

7. The court erred in holding that to grant the relief asked for does no injury to any one.

8. The court erred in holding that there is no difference in the

rule as between individuals, and where competitive proposals are invited for public work.

9. The court erred in holding that the provision of the charter of the city of Rochester that "neither the principal nor sureties on any bid or bond shall have the right to withdraw or cancel the same until the board shall let the contract for which such bid is made, and the same shall have been duly executed," did not apply to the bid submitted by complainants.

529 10. The court erred in holding that equity can interfere to prevent the enforcement of an unjust agreement induced by the mistake of one party to it.

11. The court erred in holding that the complainants had no adequate remedy at law.

12. The court erred in holding that the complainants were entitled to a decree rescinding their proposal and enjoining the defendants as prayed for in the bill of complaint.

13. The court erred in not finding that the notice for bids under which complainants submitted their bid provided that after having been delivered to the executive board their bid could not be withdrawn.

14. The court erred in not holding that complainants' bid became final and irrevocable when opened by the executive board, and could not be corrected, withdrawn, or rescinded.

15. The court erred in not holding that complainants' bid was intentionally and consciously submitted and that no mistake was made.

16. The court erred in not finding that complainants' bid was an unbalanced bid.

17. The court erred in not holding that the executive board were public officers charged with public duties, governed by public statutes, and that they were not at liberty to allow complainants to correct or withdraw their bid.

18. The court erred in not holding that complainants' bid of 50 cents for earth excavation in open trenches instead of 70 cents, and $1.50 for earth excavation in tunnel instead of $15, as it is

530 claimed by complainants these prices should have appeared, were not a mistake, but negligence on complainants' part which would bar a recovery.

19. The court erred in not holding that the proposal of complainants should not be rescinded because defendants cannot be restored to their position at the time the bid was presented.

20. The court erred in not finding that the refusal of complainants to enter into the contract under their bid entailed upon the city of Rochester a loss of $220,596, that being the difference between complainants' bid and the bid of the lowest bidder to whom the contract was awarded.

21. The court erred in not finding upon all the evidence in the case that the defendants were entitled to a dismissal of the bill of complaint.

Dated Rochester, N. Y., Oct. 4, 1897.

A. J. RODENBECK,
Solicitor for Defendants and Appellants.

(Endorsed:) Assignment of errors. Filed Oct. 5, 1897. W. S. Doolittle, clerk.

531 UNITED STATES OF AMERICA, *Northern District of New York.*

To Moffett, Hodgkins & Clarke Company:

Whereas, the City of Rochester, George W. Aldridge, William W. Barnard, and John U. Schroth, composing the executive board of the city of Rochester, have lately appealed to the United States circuit court of appeals for the second circuit from the decree entered in the circuit court of the United States for the northern district of New York, filed and entered in the office of the clerk of said court on the 9th day of September, 1897, made in favor of you the said Moffett, Hodgkins and Clarke Company, you are therefore cited to appear at the United States circuit court of appeals for the second district, at the city of New York, on the 3d day of November, 1897, to take and receive what may appertain to justice to be done in the premises.

Given under my hand in the city of Utica, in the northern district of New York, on the 4th day of October, in the year of our Lord one thousand eight hundred and ninety-seven.

ALFRED C. COXE, *U. S. J.*

(Endorsed:) In equity. 6132. Circuit court of the United States of America for the northern dist. of New York, in the second dist. The Moffett, Hodgkins and Clarke Co. ag'st The City of Rochester, George W. Aldridge, Wm. W. Barnard, and John U. Schroth, composing the executive board of the city of Rochester. Citation. Due service of a copy of the within citation admitted this 6th day of Oct., 1897. Guggenheimer, Untermeyer & Marshall, compl'ts' solicitors. U. S. circuit court, N. D. of N. Y. Filed Oct. 9, 1897. W. S. Doolittle, clerk.

532 UNITED STATES OF AMERICA, *Northern District of New York,* ss:

I, William S. Doolittle, clerk of the circuit — of the United States of America for the northern district of New York, in the second circuit, do hereby certify that the foregoing pages, numbered from 1 to 642, inclusive, contain a true and complete transcript of the record and proceeding had in said court in the case of The Moffett, Hodgkins & Clarke Company *vs.* The City of Rochester, George W. Aldridge, William W. Barnard, and John U. Schroth, composing the executive board of the city of Rochester, as the same remain of record and on file in said office and have been stipulated by the solicitors of the respective parties.

In testimony whereof I have caused the seal of the said court to be hereunto affixed at the city of Utica, in the northern district of New York, in the second circuit, this 29th day of October, in the year of our Lord one thousand eight hundred and ninety-seven

and of the Independence of the said United States the one hundred and twenty-second.

[SEAL.] W. S. DOOLITTLE, *Clerk.*

533 United States Circuit Court of Appeals for the Second Circuit, October Term, 1898.

Submitted November 10, 1898; decided December 7, 1898.

THE MOFFETT, HODGKINS & CLARKE Company, Complainant, Appellee, *vs.* THE CITY OF ROCHESTER ET AL., Defendants, Appellants. } No. 5. Appeal from the Circuit Court of the United States for the Northern District of New York.

Before Judges Wallace, Lacombe, and Shipman.

WALLACE, *Circuit Judge:*

By the decree appealed from the complainant has been released from the obligation to enter into and perform a contract with the city of Rochester for the construction of certain municipal works conformably to the terms of a written proposal delivered by the complainant to the executive board of said city. The decree adjudged the proposal void, and ordered it rescinded, upon the theory that it embodied terms inserted by the mistake of the complainant. The case presents the general question of the power of a court of equity to rescind a contract on the ground of mistake.

Under the provisions of the charter of the city of Rochester the executive board has control of the water works of the city and authority to let contracts for such extensions and additions as it may from time to time determine to make. In December, 1892, the board, having determined to make extensions and additions, invited proposals for contracts, among them for those known

534 as contract No. 1 and contract No. 2. This was done pursuant to sect. 172 of the charter, which reads as follows: "The executive board is hereby directed to cause a notice to be published in one or more of the daily newspapers of said city, at least ten days before the letting of any contract, for sealed proposals therefor, each to be accompanied by a bond signed by at least two responsible sureties, conditioned that the person, firm or corporation making such bid, if it is accepted, will perform the work or furnish the materials, or both, mentioned in such proposals, and fulfill any contract that may be made with him, them or it, and the amount specified in the bond shall be recoverable thereon in case the proposer fails to perform the conditions of the bond and its accompanying proposal; such bids shall be opened on the day named in such notice. Said board may let any contract as it deems for the best interests of tax-payers, but it shall publish all bids received by it, and the persons, firms or corporations to whom contracts are awarded. Such contracts shall be enforceable by and in the name of the city of Rochester, or said executive board as such. Neither

the principal or sureties on any bid or bond shall have the right to withdraw or cancel the same until the board shall have let the contract for which such bid is made, and the same shall have been duly executed."

Contract No. 1 contemplated the construction of a masonry conduit for a distance of 12,000 feet from Hemlock lake northward. Contract No. 2 contemplated the construction of a riveted steel pipe conduit either 38 or 40 inches in diameter and 140,000 feet long, commencing at the north end of said masonry conduit and terminating at Mt. Hope reservoir, with an option to the executive board of selecting either one of two different routes (designated as "A" and "B") over a length of about 8,000 feet.

The notice inviting bids required separate bids for the different contracts. It stated that the award would be made as soon as practicable after the bids were publicly opened and read, and that after the delivery of the bids to the board "the bid cannot be
535 withdrawn." The complainant, a corporation engaged in the contracting business, submitted proposals for each of the two contracts. Each was distinct in itself, but instead of being enclosed in a separate sealed envelope, as required by the notice to bidders, the complainant enclosed and delivered both under one cover.

The proposals of the various bidders for the work were opened by the board at the time specified in the notice, and severally read in the presence of the bidders. For contract No. 1 the bid of the complainant was about $81,000 higher than that of the lowest bidder. For contract No. 2 route "A," 38-inch pipe, the bid of the complainant was $903,324, being about $220,000 below that of the next lowest bidder; and for route "B," 38-inch pipe, the bid of the complainant was $857,552, being about $273,000 below that of the next lowest bidder.

The evidence satisfactorily proves that the complainant made a clerical error in inserting in the proposal for contract No. 2, route "B," the price of fifty cents instead of seventy cents per cubic yard for certain earth excavation (of the estimated quantity of 184,000 cubic yards) whereby the total amount of the bid, when the various items were tabulated, was $36,800 lower than it would otherwise have been. The evidence also indicates that the complainant made an erroneous estimate of the cost of certain tunnel excavation by omitting to take into consideration certain features of the work, and in consequence inserted in that proposal the price of one dollar and fifty cents per cubic yard, whereas it would have otherwise inserted a price of fifteen dollars. At the estimated quantity of this excavation the bid was $27,000 less than it would have been at fifteen dollars per cubic yard. These errors were doubtless attributable to the haste in which the specifications were considered and the proposals prepared by the complainant, a haste which was unnecessary and almost inexcusable. At the time of the public reading of the bids the complainant called the attention of the board to the mistake in the price for the earth excavation, but did not men-
536 tion the other alleged error. It did not ask to withdraw the bid; and took no further action in that behalf until about

twenty days thereafter and when the board had already awarded contract No. 1 to the lowest bidder. The complainant then sent a communication to the board insisting that its bid for the whole work included in contracts No. 1 and No. 2 was a single proposal, protesting against letting the two contracts to different contractors, and stating that clerical errors had been made in the proposal for contract No. 2, route "B," in the prices for earth excavation and tunnel excavation, and the details of the errors. The communication concluded as follows: "We therefore respectfully request either that the contract in its entirety for both sections of the work be awarded to us, at the corrected prices, or that we may be allowed to withdraw our proposal." The board after receiving this communication adopted resolutions awarding contract No. 2, route "B," to the complainant. Thereupon the complainant commenced the present action.

It is manifest that one of the alleged mistakes, that in respect to the tunnel excavation, was not a mistake in any legal sense, but was a negligent omission arising from an inadequate calculation of the cost of the work. Courts cannot permit such omissions to be brought forward by those who make them as a ground for receding from their engagements. The party in fault must have exercised at least the degree of diligence which may be fairly expected from a reasonable person.

It is also manifest that the complainant did not intend to give the board an opportunity to correct the mistakes and award the contract on the corrected basis. There was no color of foundation for the assertion that the proposals were to be treated as a single bid for contracts No. 1 and No. 2, and that both contracts must be awarded to the complainant or neither. The position thus taken by the complainant was well calculated to excite distrust on the part of the board and induce its members to believe that the alleged mistakes were an afterthought, conceived when the complain-
537 ant had become convinced by studying the proposals of its competitors that it could not profitably carry out the contract on the terms proposed.

The case differs quite radically from any reported in the books arising under the head of mistake. The contract contemplated an extensive and important undertaking, the cost of which could only be intelligently estimated after a thorough investigation of all the conditions by competent experts. It was to be let, after a competitive bidding, by a board of public officers who were not permitted to exercise any favoritism or indulgence, who were required by law to consult alone the interests of the municipality they represented, and who would be exposed to just censure if they should tolerate any modification of a proposal in his own favor by a bidder. The statute, as well as the notice to bidders, informed all bidders that a proposal once submitted could not be withdrawn. A proposal made under such circumstances is entitled to be regarded as having some attributes of finality which do not belong to ordinary contracts.

Although the charter provision does not preclude any relief by

the court to a bidder in a proper case, it is designed, in order to protect the city from the danger of collusion between the board and bidders, or between bidders themselves, to constitute a proposal a perfect contract as regards the bidder from the time of its delivery to the board. The statute would be a nullity if the board or the courts could rescind such a contract whenever the bidder has made a mistake in the terms of his proposal. The nature of the contract forbids the court to interfere with it, much less to annul it, upon any latitudinarian notions of the doctrine of mistake as administered in equity.

The general doctrine is succinctly expressed in *Am. and Eng. Enc. of Law, vol.* 15, *p.* 628, as follows: "In order that a mistake may come within the cognizance of a court of equity, it must be shown to be: first, material, or the moving cause of the complaining party's action; second, mutual or shared in by both parties to the transaction; third, unintentional; and fourth, free from negligence."

538 The salutary power of courts of equity to rescind or reform contracts which do not express the real intention of the parties is not to be extended to cases where the contract because of the mistake of one of the parties fails only to express the meaning of that party, and he seeks relief purely on the ground of his own mistake. The correct rule is as stated in *Addison on Contracts:* "Where a mistake is unilateral, and the party by whom it was made is the sufferer, relief will not be granted unless there has been some undue influence, misrepresentation, surprise or abuse of confidence." (*Vol.* 2, 1183.)

The court below adopted the opinion which has been sometimes expressed obiter by judges, and frequently quoted by text-writers, that equity will not reform a written contract unless for the mistake of both parties, but may rescind and cancel one upon the ground of a mistake by either. Thus, it is said in *Dulany vs. Rogers* (50 *Md.*, 533), "A mistake on one side may be ground for rescinding, but not for reforming a written agreement." See also *Dinan vs. Railroad Co.* (5 *R. I.*, 130); *Hearne vs. Insurance Company* (20 *Wal.*, 491); *Smith vs. Mackin* (4 *Lansing*, 41). The opinion seems to have originated in the observation in *Mortimer vs. Shortall* (2 *Drury & Warren*, 373), that "a mistake on one side might be a ground for rescinding a contract, but could never be relied on as a reason for taking from a man what he thought he was to get under his agreement," an observation which is neither lucid nor logical when read disconnected from the context. What the proposition means, and all it means, is that a contract cannot be reformed into a new contract for the mistake of one party only, but may be rescinded for a mistake of one party whenever the circumstances of the case are such that it would be inequitable to allow the other party to enforce it, and inadequacy of consideration alone is not such a circumstance. *Eyre vs. Potter* (15 *How.*, 58–59). A very extended examination of the reports has failed to disclose a case in which a judgment rescinding a contract has proceeded solely upon the ground that the terms as reduced to writing, although expressing the understand-

539 ing of one party, did not express that of the other. In all the reported cases where there was not the element of mutual

mistake, or mistake on one side with knowledge on the other, there was, in the language of Addison, "some undue influence, misrepresentation, surprise or abuse of confidence," or the contract was so oppressive as to be unconscionable.

The courts have refused to reform contracts and decreed rescission where it was plain that the terms did not represent the real agreement of the parties and it was not satisfactorily proved what were the terms of the real agreement in its entirety, or where the further terms could not be given effect without contravening the statute of frauds. So also there are many cases in the reports where the courts have refused to decree specific performance of contracts which, because of the mistake of one party, did not embody his understanding, and in these cases the plaintiff was left to his remedy at law. They proceeded on the principle that a court of equity, in the exercise of judicial discretion, will sometimes refuse specific performance of a contract which it would not order to be delivered up; for, to use the language of Lord Elden, "the distinction is always laid down that there are many cases in which the party has obtained a right to sue upon the contract at law, and under such circumstances that his conscience cannot be affected here so as to deprive him of that remedy; and yet on the other hand the court declaring he ought to be at liberty to proceed at law, will not interpose actively to aid him, and specifically enforce the contract;" *Morlock vs. Buller* (10 *Ves., Jr.*, 307). The exposition of the principle is given by Chief Justice Shaw in *Western Railroad Company vs. Babcock* (47 *Mass.*, 352), thus: "In an application to a court of equity for a specific performance, a decree for such performance is not a matter of strict right, on proof of the agreement, but may be rebutted by showing that to require such an execution would be inequitable. A defendant therefore may not only show that the agreement is void by proof of fraud or duress, which would avoid it at law; but he may also show that without any gross laches of his own he was led into a mistake, by an uncertainty or obscurity in the descriptive part of the agreement, by which he in fact mistook one line or one monument for another, though not misled by any misrepresentation of the other party, so that the agreement applied to a different subject from that which he understood at the time; or that the bargain was hard, unequal and oppressive, and would operate in a manner different from that which was in the contemplation of the parties when it was executed. In either of these cases equity will refuse to interfere, and will leave the claimant to his remedy at law."

A review of the multitude of adjudged cases upon the point is impracticable, but those which are cited and relied upon by the appellee as sustaining the proposition that a court of equity will rescind a contract merely for the mistake of one party will be referred to and considered. They are *Smith vs. Mackin* (4 *Lansing*, 41); *Ryder vs. Powell* (28 *N. Y.*, 310); *Jackson vs. Andrews* (59 *N. Y.*, 244); *Crow vs. Lewin* (95 *N. Y.*, 423); *Griswold vs. Hazzard* (141 *U. S.*, 260); *Webster vs. Cecil* (30 *Beaven*, 62); *Hartford, etc., Railroad Company vs*

Jackson (24 *Conn.*, 514); *Rowland vs. New York, etc., Railroad Company* (61 *Conn.*, 103).

Smith vs. Mackin was a case where the plaintiff had agreed in writing to surrender possession of certain real estate supposing it to be a part only of that which was included in the description, and, having discovered that the description covered the whole, brought an action to rescind the agreement. As the court states in the opinion: "The defendant knew how the fact was at the time the contract was made, and was also aware of the plaintiff's misapprehension in regard to it." The case was one where the defendant's conduct was unconscionable.

Ryder vs. Powell was an action to reform a bond and mortgage. As expressed the bond and mortgage did not correspond with the agreement of the parties, which fact the plaintiff discovered the next day. The defendant knew all along that it did not; his conduct was unconscionable.

541 *Jackson vs. Andrews* was an action brought to reform a deed given by the plaintiff to the defendant, and also a mortgage given by the defendant to the plaintiff, upon the theory that the land was to be conveyed without a warranty of title and that the covenants of warranty in the deed were inserted by the fraud of the defendant or by mutual mistake, and plaintiff sought to reform the mortgage by inserting a covenant by the defendant that the entire principal should become due after default in payment of any installment of principal or interest for thirty days. Issues of fact were submitted to a jury and of their findings the court observed: "It will be seen that while this verdict furnishes evidence that the plaintiff may not have known fully the facts, and perhaps the contents of the paper executed and received by him, it utterly fails to show that the defendant ever agreed, or understood, that he was to receive a deed of the lots without covenants as to title, or to give a mortgage containing any provisions in addition to that delivered by him." The court held that the court below properly refused to decree reformation.

Crow vs. Lewin was an action brought to rescind a contract for the exchange of lands, for which conveyances had been executed. The court said: "In this case the minds of the parties never met. The contract in form was not a contract in fact. It originated in mistake, and that mistake not mutual and about the same thing, but different on the part of each. What one meant to sell the other did not mean to buy, and what one meant to buy the other did not mean to sell." A decree was entered requiring a reconveyance by the parties respectively, thus rescinding the transaction. The case was one where the contract did not express the intentions of either party.

Griswold vs. Hazzard was an action to cancel or reform a bail bond by one of the sureties. Referring to the conclusion that the bond ought not to be allowed to stand uncorrected the court said: "If it be not justified on the ground of mistake as to the mutual agreement, superinduced by the conduct of the party seeking now to

take advantage of it, there could be no escape from the con-
542 clusion that the taking of a bond that made Griswold absolutely liable as surety for any amount adjudged to be due from Durant, and not greater than the penalty so named, was under all the circumstances disclosed a fraud in the law upon him."

Webster vs. Cecil was an action to rescind an agreement for the sale of lands evidenced by a written proposal by one party and a written acceptance by the other. The proposal of the vendor, by inadvertence on his part, named a price which was less than half that which he had just refused, upon the offer of the vendee, during the negotiations. The case was one where the vendee knew when he transmitted his acceptance that the proposal did not express the intention of the vendor.

The cases, 24 *Conn.*, 514, and 61 *Conn.*, 103, were actions at law where the question was whether a railroad company was entitled to charge its ordinary freight rates for carrying freight after there had been a preceding negotiation in which the minds of the parties had not met in respect to a different rate. They throw little light upon the present question.

In the opinion of the court below some of the foregoing adjudications were cited, and in addition the cases *Bradford vs. Union Bank* (13 How., 57), and *Snell vs. Insurance Company* (98 U. S., 85), were cited.

Bradford vs. Union Bank was a bill for specific performance of an agreement by the defendants to convey land. So far as the case involved the question of mistake, it was one of a mutual mistake of parties.

Snell vs. Insurance Company was a suit to reform a policy of insurance. The court said: "We have before us a contract from which, by mistake, material stipulations have been omitted, whereby the true intent and meaning of the parties are not fully or accurately expressed. In the attempt to reduce the contract to writing there has been a mutual mistake, caused chiefly by that party who now seeks to limit the insurance to an interest in the property less than that agreed to be insured. The written agreement did not
543 affect that which the parties intended. That a court of equity can afford relief in such a case is we think well settled by the authorities."

A court of equity cannot undertake to make a contract for parties which they have not made themselves, and would equally transcend its just powers by compelling a party to relinquish the fruits of a contract which he has honestly made and in which there is no taint of wrong to affect his conscience. The rescission or cancellation of a contract is certainly as drastic an interference with its provisions as a modification of it. The consequences may be equally or even more injurious to the party who is deprived of the benefits to which he is entitled by it; and there is no sound reason, and as we think no well-considered authority, for the proposition that although a court of equity will not reform a contract except for the mistake of both parties, it will rescind one merely for the mistake of one party.

"It would be the height of injustice to alter a contract on the ground of mistake, where the mistake arises from misconception by one of the parties, in consequence of his imperfect explanation of his intentions. To make a contract it is requisite that the minds of the contracting parties agree on the act to be done; if one party agrees to a contract under particular modifications, and the other party agrees to it under different modifications, it is evident there is no contract between them. If it be clearly shown that the intention of one of the parties is mistaken and misrepresented by the written contract, that cannot avail unless it further be shown that the other party agreed to it in the same way, and that the intention of both of them was by mistake misrepresented by the written contract." Spencer, *C J.*, in *Lyman vs. United Insurance Co.* (17 *Johnson*, 376); see also *Nevins vs. Dunlap* (33 *N. Y.*, 676); *Ger. Am. Ins. Co. vs. Davis* (131 *Mass.*, 316); *Luddington vs. Ford* (33 *Mich.*, 133); *Dyas vs. Stafford* (7 *L. R. I.*, 606). These observations are as apposite to an attempt to rescind a contract as to an attempt to reform one.

544 By the decree of the court below the contract completed by the terms of the proposal has been completely annulled. It may have been an improvident contract on the part of the complainant, but clearly justice would have required nothing further, if the contract had been an ordinary one entered into by a proposal and acceptance, than to reform the contract so as to correct the mistake, and as reformed, permit the city of Rochester to have the benefit of it. As it is, the complainant has been wholly absolved from the obligations of a contract which it deliberately entered into, and which it was the legal duty of the executive board to cause to be fulfilled. If the complainant in his bill had prayed for a reformation, and offered to execute the contract when so reformed as to correct its own mistakes, it would have presented itself in an attitude which would at least have commanded the sympathy of the court. As the case has been presented, it seems to be without equity, and the decree is therefore

Reversed with costs, and with instructions to the court below to dismiss the bill.

Joseph H. Choate, for the appellants.

Louis Marshall, for the appellee.

545 At a stated term of the United States circuit court of appeals, in and for the second circuit, held at the court-rooms, in the post-office building, in the city of New York, on the 19th day of December, one thousand eight hundred and ninety-eight.

Present: Hon. William J. Wallace, Hon. E. Henry Lacombe, Hon. Nathaniel Shipman, circuit judges.

THE MOFFETT, HODGKINS & CLARKE CO., Complainant, Appellee,
vs.
THE CITY OF ROCHESTER ET AL., Defendants, Appellants.

Appeal from the circuit court of the United States for the northern district of New York.

This cause came on to be heard on the transcript of record from the circuit court of the United States for the northern district of New York and was argued by counsel.

On consideration whereof it is now hereby ordered, adjudged, and decreed that the decree of said circuit court be, and it hereby is, reversed with costs, and that the said court be, and hereby is, instructed to dismiss the bill.

It is further ordered that a mandate issue to the said circuit court in accordance with this decree.

W. J. W.

[Endorsed:] United States circuit court of appeals, second circuit. Moffett, Hodgkins & Clarke Co. *vs.* City of Rochester. Order for mandate.

(Endorsed:) United States circuit court of appeals, second circuit. Filed Dec. 20, 1898. William Parkin, clerk.

546 UNITED STATES OF AMERICA, *Southern District of New York,* } *ss:*

I, William Parkin, clerk of the United States circuit court of appeals for the second circuit, do hereby certify that the foregoing pages numbered from 1 to 545, inclusive, contain a true and complete transcript of the record and proceedings had in said court in the case of Moffett, Hodgkins & Clarke Co., complainant, appellee, against City of Rochester *et al.*, defendants, appellants, as the same remain of record and on file in my office.

Seal United States Circuit Court of Appeals, Second Circuit.

In testimony whereof I have caused the seal of the said court to be hereunto affixed, at the city of New York, in the southern district of New York, in the second circuit, this 19th day of January, in the year of our Lord one thousand eight hundred and ninety-nine, and of the Independence of the said United States the one hundred and twenty-third.

[Ten-cent U. S. internal-revenue stamp, canceled 1, 19, '99, W. P.]

WM. PARKIN, *Clerk.*

547 United States Circuit Court of Appeals for the Second Circuit, October Term, 1898.

Submitted November 10, 1898; decided December 7, 1898.

THE MOFFETT, HODGKINS & CLARKE Company, Complainant, Appellee, *vs.* THE CITY OF ROCHESTER ET AL., Defendants, Appellants.	No. 5. Appeal from the Circuit Court of the United States for the Northern District of New York.

Before Judges Wallace, Lacombe, and Shipman.

SHIPMAN, *Circuit Judge:*

I concur in the result reached in this case, but not in all the restrictions which the opinion will be construed to place upon the power of a court of equity, either to reform or rescind contracts upon the ground of mistake. The word mistake is of so broad a character and includes so many varied circumstances that rules which undertake to define what a court of equity can do or cannot do in regard to the correction of a mistake, either unilateral or mutual, seem to me to confuse rather than to enlighten. Each case must in a great measure be governed by its own circumstances which appeal or do not appeal to the judgment or the conscience of the chancellor.

If the case now under consideration was simply that the complainants offered to do specified work and nothing else for the city of Rochester for about $857,000, that in this single proposal there was a clerical error of about $36,000, notice of which was communicated to the city when the proposal was being read, that
548 it was accepted as written, that the fact of the mistake was hardly denied and clearly appeared upon judicial investigation, it would seem to me that the power of a court of equity to purge a contract from such an error, upon such terms as should be just to the city, or to rescind it entirely if the amendment was found to be impracticable, ought to be generally recognized.

This record presents other circumstances which are important. After the bid of another party upon contract No. 1 had been accepted, the complainant protested that it was entitled to both contracts, an assertion which the city's proposals showed to be without foundation, and offered to do all the work upon the correction of the two alleged errors in No. 2, a proposition which it was impossible for the city to accept. At this stage of the business, the complainants wanted to do the entire work and apparently wanted nothing else. Their conduct compelled the city's agents to go forward and complete the award of contract No. 2 in accordance with the terms of the bid.

The complainant, thereupon, without any additional statement or negotiation, defaulted and the city gave the contract to the next lowest bidder, for a much larger sum than that contained in the complainant's proposals.

The bill of complaint prays for a reformation and amendment of

the proposal upon contract No. 2 in respect to the two alleged errors, or for its rescission and cancellation; also that the defendant be either required to enter into a contract for the work described in both contracts as reformed, or that the bids for the whole work be rejected. To compel the city to contract with the complainants for the whole work would be manifestly improper. The alleged error in regard to the tunnel excavation was not one *of* which can properly be called a mistake; it was the result of negligence. The question, therefore, is shall the contract No. 2 be reformed or rescinded by reason of the single error. A decree for the reformation of a contract presupposes a willingness on the part of the mistaken person to execute as reformed. The history of the case, as shown in the record, makes it very doubtful whether a willingness to execute contract No. 2 existed. The complainant,
549 it is right to assume, honestly blundered in supposing that the contracts were to be let for the entire work, which was the result at which it was aiming both in its proposals and in its subsequent proposition. It made three kinds of mistakes. It supposed, or acted as if it supposed, that both proposals must be considered together and be accepted, or be rejected; it made one clerical error in one proposal and also an error through haste in filling out the estimates. It is impossible to say that it was ever willing to carry out that contract with or without the correction, or that its default was occasioned by the clerical error. It is as probable that it would have defaulted with a correction, as without it. A rescission cuts off the city from the right to sue upon its penal bond by reason of the default of the complainants, which I think ought not to be permitted under the circumstances heretofore stated.

Joseph H. Choate, for the appellants.
Louis Marshall, for the appellee.

550 UNITED STATES OF AMERICA, }
Southern District of New York. }

I, William Parkin, clerk of the United States circuit court of appeals for the second circuit, do hereby certify that the annexed paper is a true copy of the concurring opinion of Judge Shipman in the cause entitled The Moffett, Hodgkins & Clarke Company against The City of Rochester, as the same remains of record and on file in this office.

In testimony whereof I have hereunto set my hand and the seal of this court this 15th day of February, in the year of our Lord one thousand eight hundred and ninety-nine.

[Seal United States Circuit Court of Appeals, Second Circuit.]

WM. PARKIN,
Clerk of United States Circuit Court of Appeals for the Second Circuit.

[Ten-cent U. S. internal-revenue stamp, canceled, W. P.]

551 [Endorsed:] United States circuit court of appeals, second circuit. Moffett, Hodgkins & Clarke Co. *v.* City of Rochester. (Copy.) Certified concurring opinion. 2.30.

552 UNITED STATES OF AMERICA, *ss*:

[Seal of the Supreme Court of the United States.]

The President of the United States of America to the honorable the judges of the United States circuit court of appeals for the second circuit, Greeting:

Being informed that there is now pending before you a suit in which The City of Rochester *et al.* are appellants and The Moffett, Hodgkins & Clarke Co. is appellee, which suit was removed into the said circuit court of appeals by virtue of an appeal from the circuit court of the United States for the northern district of New York, and we, being willing for certain reasons that the said cause and the record and proceedings therein should be certified by the said circuit court of appeals and removed into the Supreme Court of the
553 United States, do hereby command you that you send without delay to the said Supreme Court, as aforesaid, the record and proceedings in said cause, so that the said Supreme Court may act thereon as of right and according to law ought to be done.

Witness the Honorable Melville W. Fuller, Chief Justice of the United States, the sixth day of March, in the year of our Lord one thousand eight hundred and ninety-nine.

JAMES H. McKENNEY,
Clerk of the Supreme Court of the United States.

554 [Endorsed:] Supreme Court of the United States. No. 720, October term, 1898. The Moffett, Hodgkins & Clarke Co. *vs.* The City of Rochester *et al.* Writ of certiorari. United States circuit court of appeals, second circuit. Filed Apr. 4, 1899. William Parkin, clerk.

555 Supreme Court of the United States.

THE MOFFETT, HODGKINS AND CLARKE COMPANY, Petitioner, Appellee,
against
THE CITY OF ROCHESTER, GEORGE W. ALDRIDGE, WILLIAM W. Barnard, and John W. Schroth, Composing the Executive Board of the City of Rochester, Defendants, Appellants.

It is hereby stipulated that the certified transcript of the record of this cause in the United States circuit court of appeals, heretofore filed in the office of the clerk of the United States Supreme Court on the complainant's application for a writ of certiorari, be taken as the return to the writ of certiorari issued on such application on the sixth day of March, 1899, with the same force and effect as though an additional certified transcript of said record and of all proceed-

ings had in this cause had been filed in obedience to the mandate in said writ contained.

Dated at the city of New York, March 8th, 1899.

GUGGENHEIMER, UNTERMYER & MARSHALL,
Solicitors for Petitioner, Appellee.
JOHN F. HERRING,
Solicitor for Defendants, Appellants.

556 [Endorsed:] Duplicate original. Supreme Court of the U. S. The Moffett, Hodgkins and Clarke Company, petitioner, appellate, against The City of Rochester & o'rs, etc. Stipulation that record filed on application for writ of certiorari be taken as return to writ. Guggenheimer, Untermyer & Marshall, attorneys for petitioner & appellee, Johnston building, No. 30 Broad street, borough of Manhattan, city of New York.

557 To the honorable the Supreme Court of the United States:

The record and all proceedings in the cause whereof mention is within made having been lately certified and filed in the office of the clerk of the honorable the Supreme Court of the United States, a certified copy of the stipulation of counsel is hereto annexed, and under the direction of counsel for the appellant said stipulation is certified as a return to this writ.

New York, April 5th, 1899.

[Seal United States Circuit Court of Appeals, Second Circuit.]

WM. PARKIN,
Clerk of the United States Circuit Court of Appeals for the Second Circuit.

[Ten-cent U. S. internal-revenue stamp, canceled 4, 4, '99. W. P.]

558 [Endorsed:] United States circuit court of appeals, second circuit. Moffett, Hodgkins & Clarke Co. *vs.* City of Rochester. Return to writ of certiorari.

559 [Endorsed:] File No., 17,305. Supreme Court U. S., October term, 1899. Term No., 217. Moffett, Hodgkins & Clarke Company, petitioner, *vs.* The City of Rochester *et al.* Writ of certiorari and return. Filed April 6, 1899.